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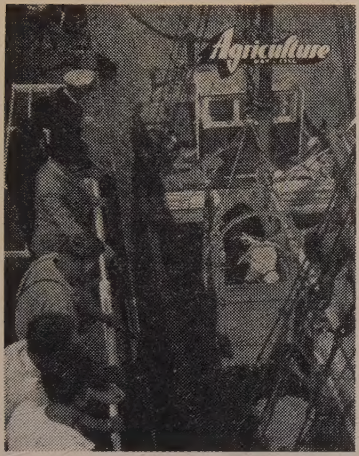
Minister of Agriculture

This Month's Cover



Livestock represent New Zealand's greatest single asset and efforts are constantly made, through research and by better management of the animals and their environment, to improve returns from flocks and herds. The importance of new blood in improving carcass quality and constitution has always been recognised and reflected in importations of top-grade stud stock, chiefly from the United Kingdom. This month's cover, which was reproduced from a colour photograph by J. E. Toghill, shows one of a shipment of pedigree cattle from Britain being transferred from an overseas ship at Auckland to a vessel which will take the cattle to Motutapu Quarantine Station in the Hauraki Gulf.

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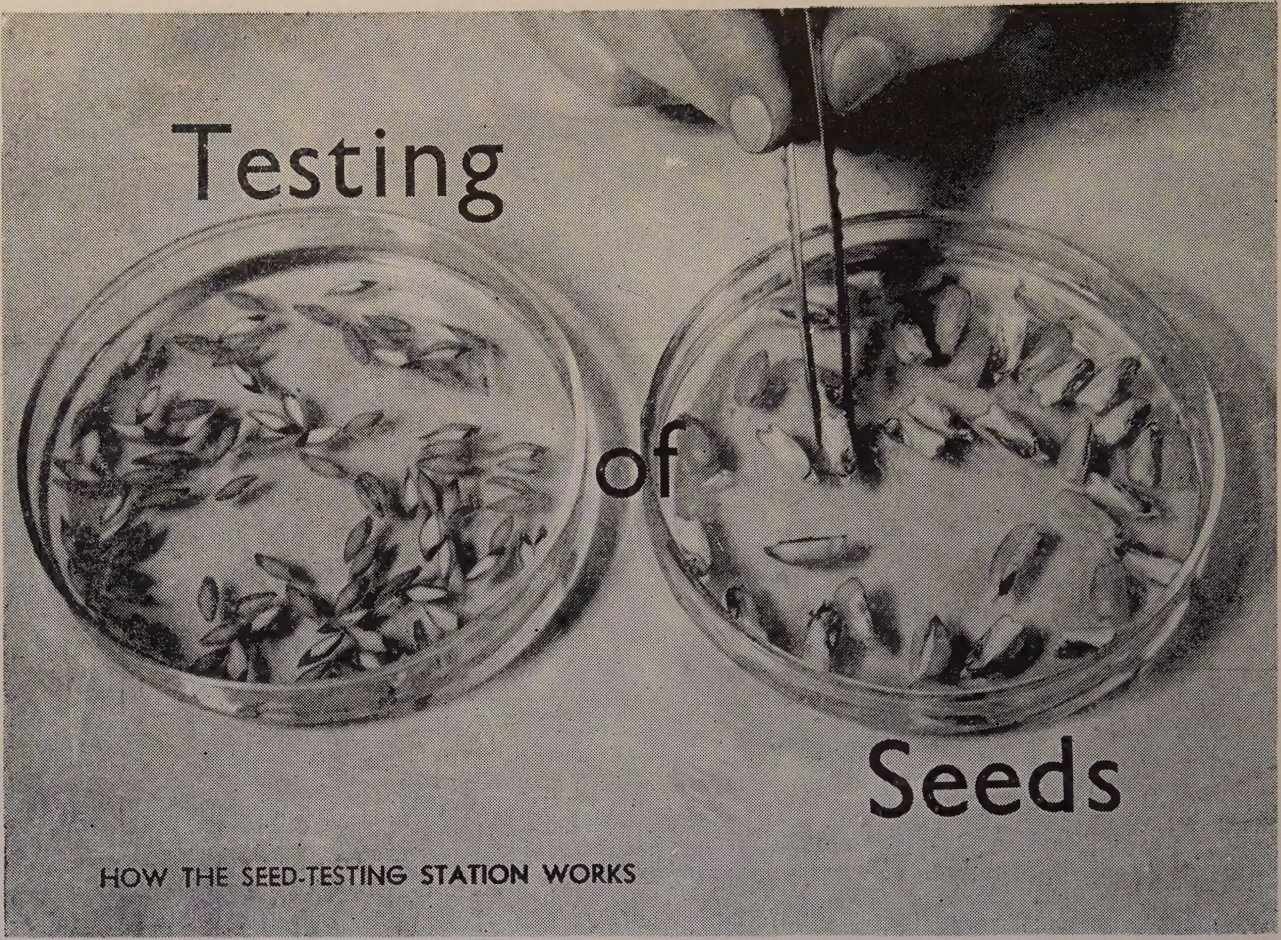
Testing of Seeds

HOW THE SEED-TESTING STATION WORKS



By **A. V. LITHGOW,**

Officer in Charge, Department of Agriculture Seed-testing Station, Palmerston North

NEW Zealand during the last 50 years has gained a reputation for the application of science to farming. Not the least of her accomplishments in this respect have been the successful establishment of a seed-testing service and the acceptance by the farmer of the necessity for sowing tested seed.

PRACTICALLY all seed grown in New Zealand is analysed at the official Seed-testing Station at Palmerston North. Operated by the Extension Division of the Department of Agriculture, the Station has an excellent reputation both at home and abroad. It is a member of the International Seed Testing Association and as such is completely up to date in methods of testing. The illustrations show the care taken in the important work of seed analysis.

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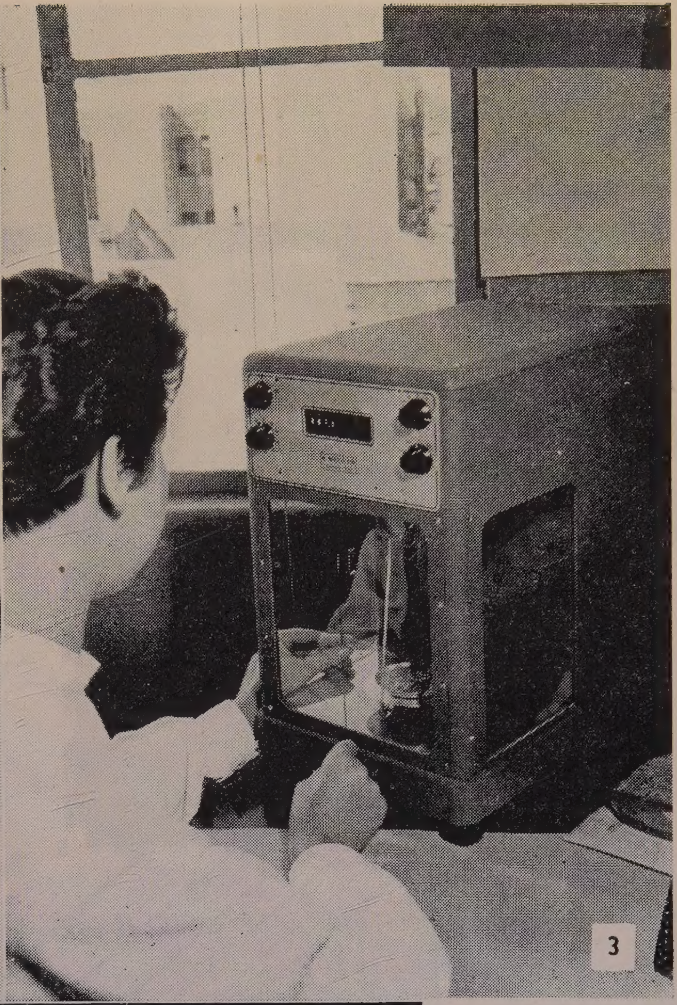
1. Good lighting is essential for accurate analysis. In this laboratory 30 analysts using modern equipment make purity analyses.

2



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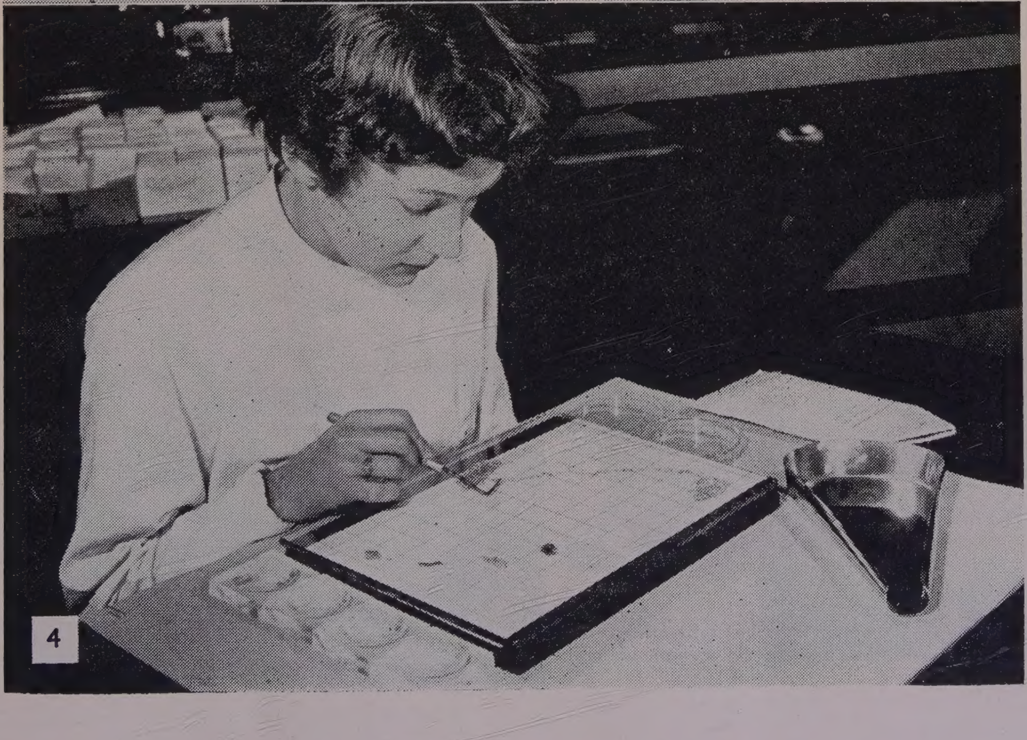


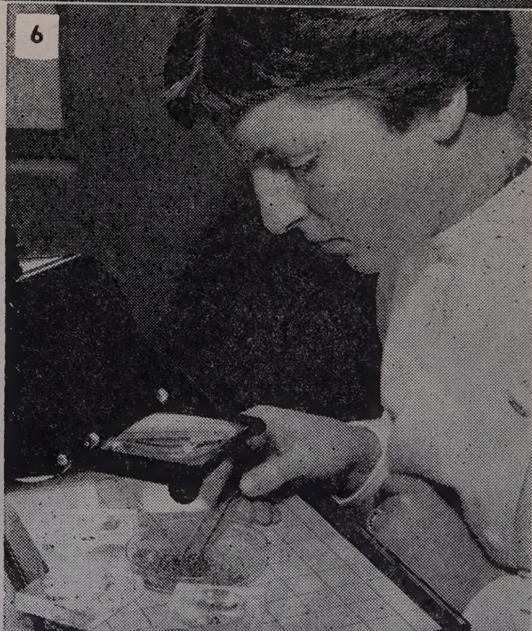
4

2. An electrically driven, imported sampler first mixes the sample to ensure uniformity and then splits it into two. The relatively small amount of seed required by the analyst is obtained by passing the seed several times through this machine.
3. The comparatively large amounts analysed of seeds such as peas and lupins are weighed on conventional scales. For small seeds a balance sensitive to 1/280,000oz. is used.
4. Small seeds are drawn in a thin line across a sheet of glass. Every seed is examined, as the analyst must decide whether the material she is examining is seed of the kind submitted, seed of some other crop, weed seed, or inert matter.

5

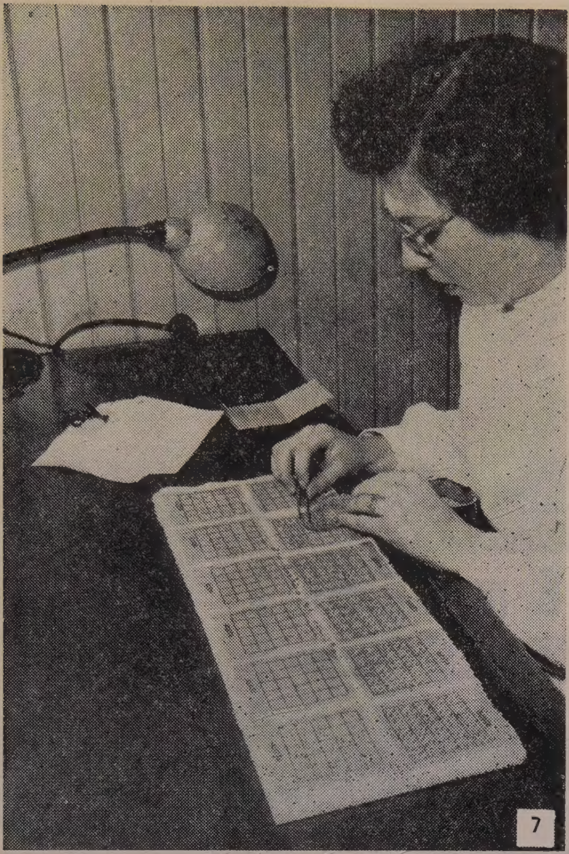
Examining Impurities

6

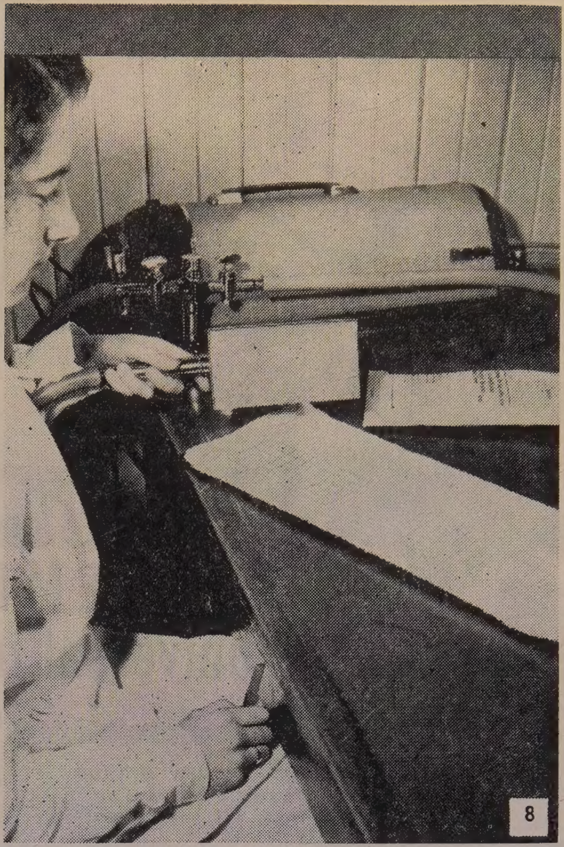


5. Unfamiliar seeds are referred to a senior officer of the Station, who compares them with known seeds from the extensive collection. If a seed still cannot be identified, it is grown in the glasshouse and the plant examined by a member of the research staff.

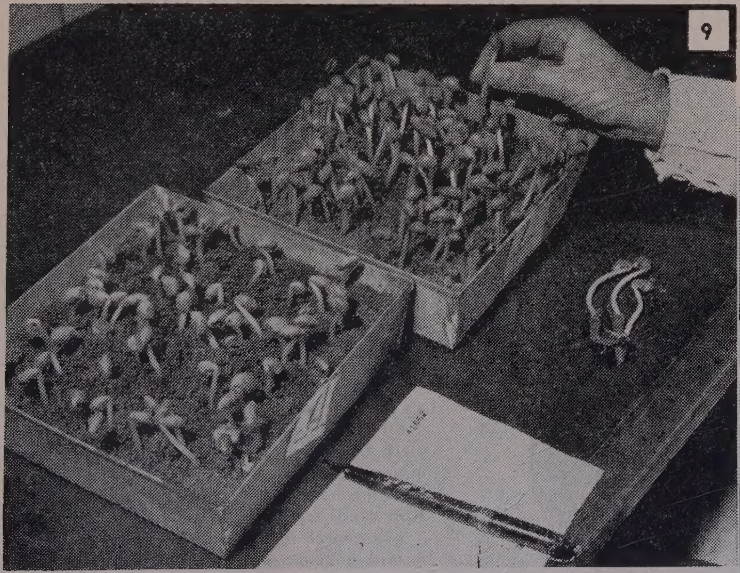
6. Before the results of an analysis are reported the separations are examined by a supervisor. This is desirable to maintain a high, uniform standard of work.



7. Small seeds are usually germinated on filter paper printed with 25 squares, the analyst placing 4 seeds in each square.



8. With some seeds a vacuum counter may be used. It is a box with 100 tiny holes on one side. Seed is poured on to the perforated face and suction holds one seed over each hole. The rest of the seed is tipped off. The face of the box is placed over the filter paper and as the vacuum is released exactly 100 seeds are left on the filter paper.



9. Large seeds such as lupins and peas are germinated in sand or on toilet tissue.

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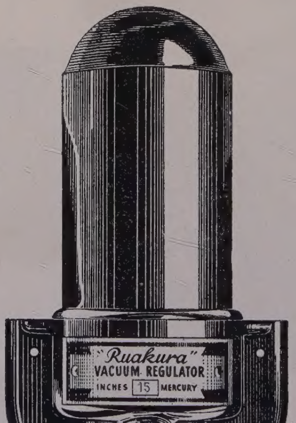
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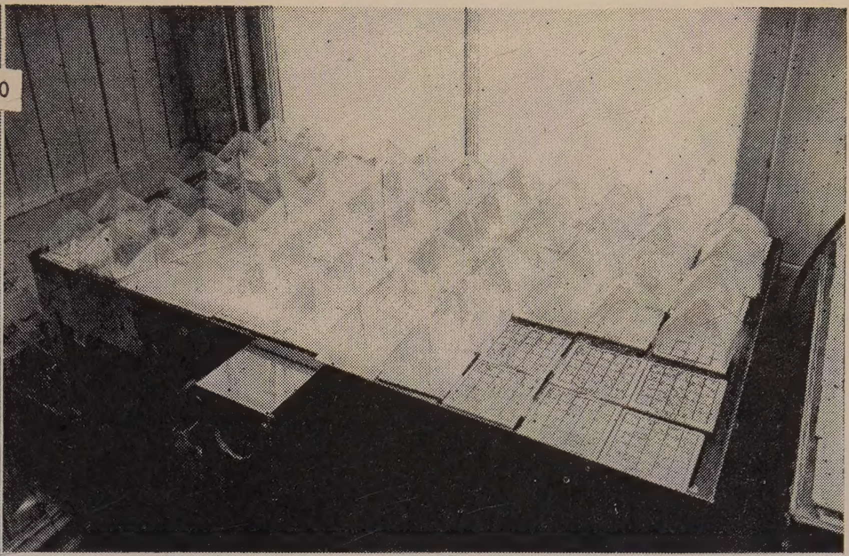
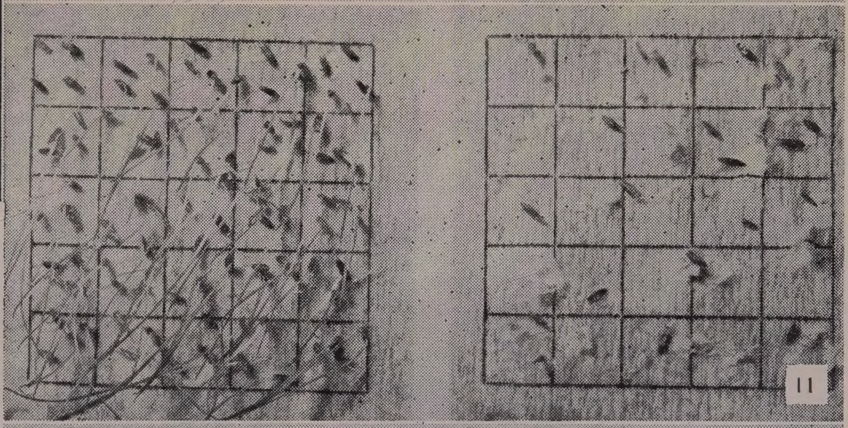
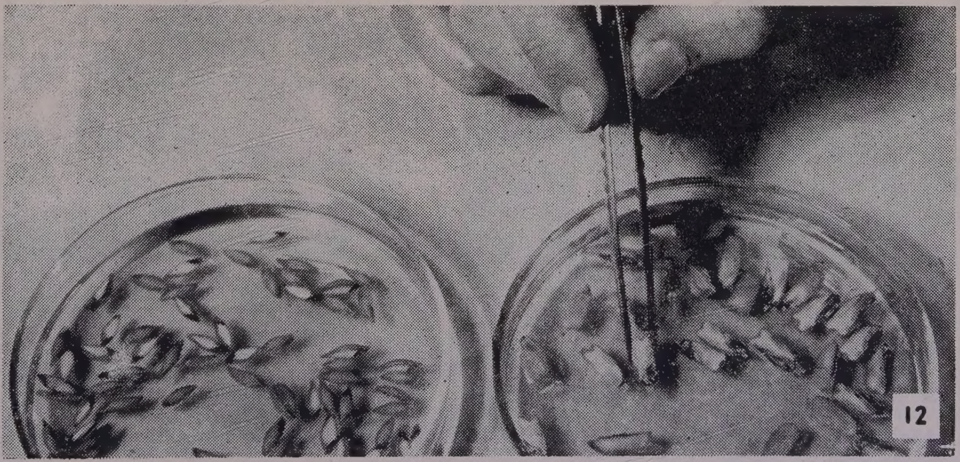


Testing for Germination



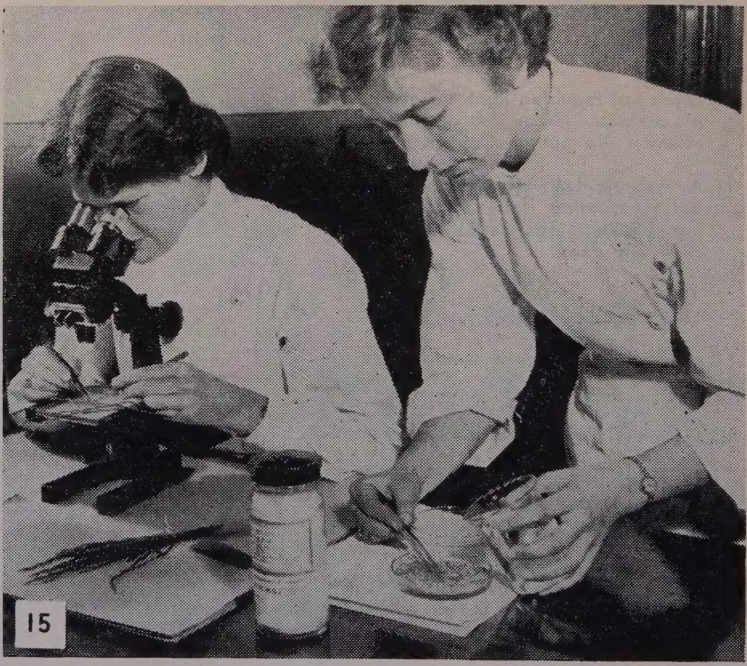
10. Seeds not requiring light are germinated in cabinets. Those for which light is essential are put on Copenhagen tanks.

11. A ryegrass test after germination and before counting (left) and after counting (right). The seeds remaining at right are dead.



12. Germination tests cannot be hurried. With some tree seeds months pass before a test is complete. To obtain rapid information as to whether or not seed will grow, large seeds are soaked in water, cut in two, and immersed in a chemical solution (a tetrazolium salt). By a careful examination of the stained portions it is possible to tell whether the seed is alive or dead. The whole process takes 2 days. The seed on the left is barley and that on the right is maize.

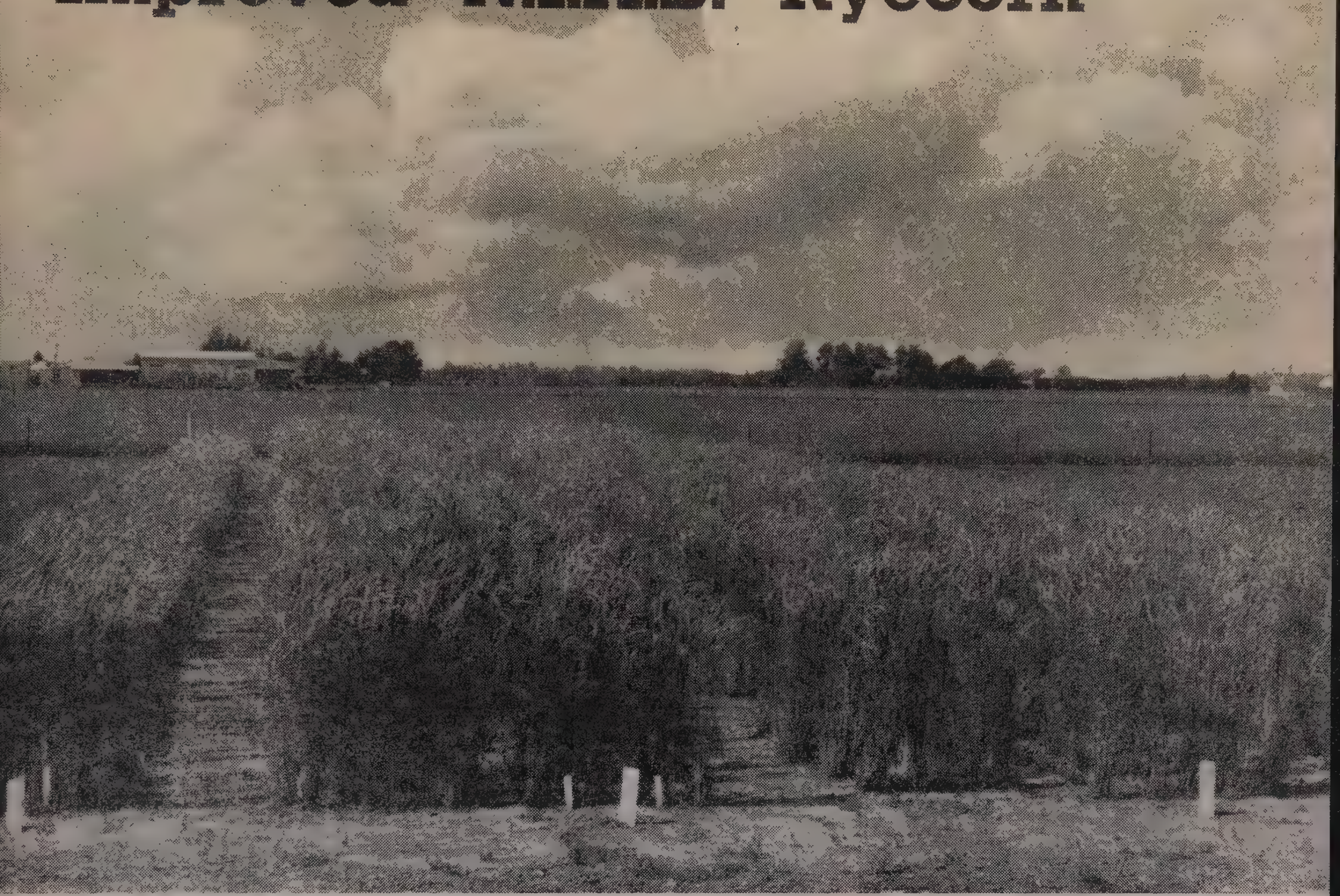
13. White clover seedlings are placed in test tubes. An organic solvent is added and a strip of filter paper—bright yellow through being dipped in picric acid—is held on the inside of the tube by the cork. When the tubes are placed in a low temperature oven the paper in those containing seedlings from the better type of white clover seedlings turns dark brown. On the right an analyst is comparing colour to enable her to select the better-type samples.



14. Cereals should not be harvested until the grain has dried out sufficiently. The amount of moisture in grain can be estimated in the laboratory by grinding to a coarse meal. A portion is weighed accurately, dried in an oven, cooled, and weighed again. The loss is the weight of water driven off in the oven.

15. The greatest cause of low germination in ryegrass seed in New Zealand is blind seed disease. Samples of ripe ryegrass taken from paddocks before harvesting are examined in the laboratory. Seed is rubbed out by hand, soaked in caustic potash, and examined under a microscope. The analyst records the percentage of diseased seed and the farmer is advised whether or not the paddock is worth cutting for seed.

Improved N.I.A.B. Ryecorn



By A. F. GREENALL,

Crop Research Division, Department of Scientific and Industrial Research, Lincoln

ONE of the main reasons for a renewed interest by farmers in ryecorn and an increase in the acreage grown is the good performance of N.I.A.B. ryecorn. Certified N.I.A.B. ryecorn was first released to farmers in 1951 and since then further improvement to this variety has been made by plant breeding and selection. An improved strain was released this autumn as Certified Mother N.I.A.B. ryecorn.

A VARIETY of ryecorn bred at the National Institute of Agricultural Botany, Cambridge, England, was obtained by the Crop Research Division, Department of Scientific and Industrial Research, Christchurch, in 1944. One of the routine tasks of this Division is to obtain seed of overseas varieties which appear suitable for New Zealand conditions and to carry out preliminary trials to determine which new varieties are an improvement on the standard commercial ones. Lines which show promise at Lincoln are subsequently tested in many localities by field officers of the Extension Division of the Department of Agriculture.

This N.I.A.B. variety was compared at Lincoln with other introduced ryecorns and with New Zealand commercial ryecorn, which probably originated from the Emerald strain. By 1948 N.I.A.B. had been shown to be superior not only to other ryecorn varieties but to many oat and barley varieties in common use as cereal greenfeeds. Consequently it was decided to make single plant selections for seed increase and early release to farmers and as well to begin a breeding programme to improve the variety.

Single plants with high forage yield, good recovery after grazing, profuse tillering, and low crowns were selected in a grazing block sown with the original N.I.A.B. ryecorn. The seed from these single plants was sown for checking of performance, the best 100 single plants were selected as a basis for the breeding programme, and the seed from the remaining plants was bulked, increased, handed to the Department of Agriculture in 1950, and released by it to farmers in 1951 as Certified N.I.A.B. ryecorn.

Value Quickly Recognised

Farmers themselves were quick to recognise the value of N.I.A.B., even though trials in which a mowing technique was mainly used had provided yield results which were not particularly favourable. Early work by J. P. Malcolm at the Crop Research Division had, however, suggested that a higher and more reliable yield estimate of N.I.A.B. ryecorn was provided by hand cutting than by mowing. Subsequent trial work at this Division by the writer strongly supports this suggestion.

Ryecorn is mainly cross fertilised, and this results in the progeny having a wider range of variation than the

HEADING PHOTOGRAPH: The N.I.A.B. ryecorn polycross area.

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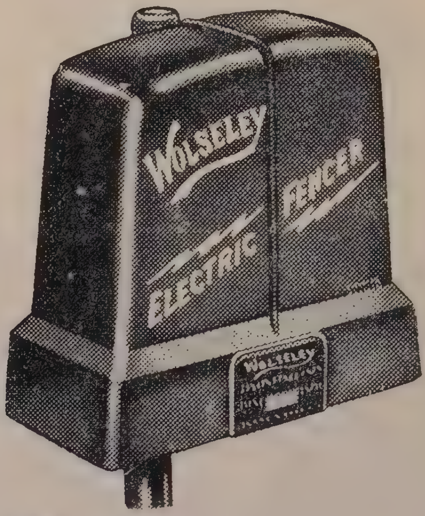

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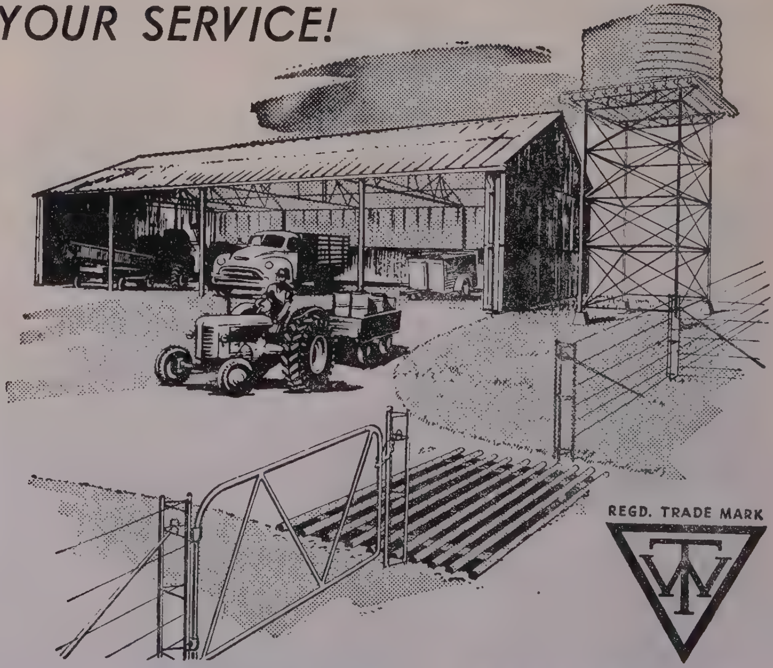

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parents. Without selection the proportion of undesirable types of plants increases in each succeeding generation. Culling of these low-producing or off-type plants is necessary to maintain the performance of the bulk line. With ryecorn, which has an annual cycle of sowing, grazing, and harvesting for seed, those plants which have high seed yield but not necessarily high forage yield increase more rapidly than other plants in the bulk line. Culling of the low-producing plants prevents this kind of deterioration also.

Use of Polycross Block

With no further selection the production of N.I.A.B. ryecorn released in 1951 would have slowly decreased. Selection therefore had to be continued either on the moderate scale necessary for maintenance of performance or on the more elaborate basis necessary for further improvement. As improvement was possible and desirable and as it was necessary to supply annually pure N.I.A.B. ryecorn seed to the Department of Agriculture (the provision of pure seed of most crops is one of the important routine tasks of the Crop Research Division), these two needs were combined in one project. The two requirements were met by the use of a polycross block, together with progeny testing, which makes it possible to discard lines that do not cross to produce progeny as good as or better than their parents.

IMPROVED N.I.A.B. RYECORN

A N.I.A.B. grazing trial in 1955 in which the improved N.I.A.B. ryecorn (background) was compared with Winter Grey oats (foreground).

A stand of improved N.I.A.B. ryecorn.

Small plots of 10 spaced plants sown with seed from the 100 single plants selected in 1949 were grown together in an area isolated from other crops of ryecorn. Ten replicates were sown with random distribution of individual plots to obtain as wide a range of cross pollination of individual plants as possible. It was considered necessary to grow 100 lines, 1000 plots, and 10,000 plants annually both to retain variability and to avoid the possible effects of inbreeding. Eye estimation was used to reject the poorest 25 per cent. of the lines, which were pulled and discarded before flowering.

The two best plants of each of the remaining lines were selected on forage yield, type, and other desirable characters, final selection of one plant of each pair being made on seed yield. More than one plant—in some cases 3 or 4, but from different plots—of the very best lines was selected to maintain the number of single plants at 100 for the following season's polycross block.

In a progeny-testing area was grown half of the seed threshed from all the remaining plants of each selected line. The performance of these under grazing was used first to aid rejection of 25 per cent. of the lines in the polycross block (there is half-sister relationship between corresponding lines of progeny and polycross blocks) and secondly to determine which 12 lines were to be selected for seed increase. The reserve seed of these 12 lines was then sown for seed increase for handing to the Department of Agriculture to be multiplied and released as Certified Mother N.I.A.B. ryecorn.

This procedure is being repeated annually and ensures that as soon as any improvement is made, farmers are given the benefit of it. Great care was taken to provide sufficient isolation to eliminate cross fertilisation except within the selected N.I.A.B. lines of the required high standard.

Advantages of Improved N.I.A.B.

Each year check plots of the N.I.A.B. ryecorn released in 1951 have been sown at random in both the polycross block and the progeny-testing area, but these are removed before flowering. From the comparisons made by eye the improved N.I.A.B. is evidently quicker establishing, recovers more quickly after grazing, and has a higher forage yield than the N.I.A.B. at present in farm use. Though slightly less prostrate, it is more uniform and retains the low-crown and profuse-tillering characters of the variety.

In 1955 a comparison was made at Lincoln between the performance under grazing of Winter Grey oats and the improved N.I.A.B. ryecorn. The ryecorn outyielded the oats in dry matter production by 35 per cent., in grazing days by 25 per cent., and in liveweight increase of ewe hoggets by 50 per cent. These results should, of course, be interpreted with the caution necessary in comparing the performance of two species in only 1 year and 1 district.

The first seed of this programme, begun in 1949, was distributed this autumn by the Extension Division of the Department of Agriculture, to which the Crop Research Division will make available annually reselected seed for multiplication. The seed distributed by the Extension Division was intended for further seed multiplication under certification and not for greenfeed production.

Where farmers require a cereal greenfeed winter pasture that is sown before the winter and spring feed position can be estimated this improved N.I.A.B. is valuable, as its range of use is broad. It establishes quickly, tillers profusely, yields well, particularly during winter and spring, and recovers well with little reduction in stand even under severe grazing. It is readily eaten by stock and is almost the only cereal greenfeed that most farmers are prepared to use as the sole grazing for in-lamb ewes. Provided stock are removed at the first signs of "shooting", it will usually give a good seed yield.

Without nitrogenous fertilisers soils low in available nitrogen are unsatisfactory for N.I.A.B. ryecorn, which under such conditions also tends to shoot rather early in spring. It is susceptible to leaf rust attack, which sometimes may be severe, particularly when the crop is infrequently or lightly grazed. However, these weaknesses do not generally detract from its undoubted value.

Reference

S. M. J. Stockdill, "The New Zealand Journal of Agriculture", vol. 85, p. 283, 1952.

Photographs by Department of Scientific and Industrial Research.

Meteorological Records for March

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	64.6	+0.8	82.9	41.8	2.34	10	—1.84	1.46	9	160
Auckland	160	65.5	+0.6	80.9	46.6	1.16	12	—1.99	0.36	25	216
Tauranga	10	62.2	—0.4	80.6	39.3	1.98	11	—2.12	0.61	31	220
Ruakura	131	60.5	—0.7	84.3	34.0	1.41	11	—1.57	0.41	25	203
Rotorua	975	60.0	—0.5	81.0	34.5	1.39	10	—2.48	0.44	25	201
Gisborne	12	60.0	—2.0	82.3	41.4	3.55	14	—0.15	0.88	27	194
New Plymouth	160	61.0	+0.0	79.6	39.0	1.61	10	—2.13	0.87	4	212
Karioi	2125	54.0	—1.1	82.0	28.2	1.63	13	—0.71	0.45	10	
Napier	5	61.0	—1.4	80.4	39.8	1.36	7	—1.22	0.82	4	205
Wanganui	72	60.8	—0.8	75.4	37.4	0.65	7	—1.50	0.33	19	201
Palmerston North	110	59.4	—0.9	81.0	32.0	0.81	12	—1.42	0.45	4	180
Waingawa	340	57.3	—1.7	90.8	31.0	2.43	13	+0.23	0.52	18	194
Wellington	415	58.4	—1.0	72.0	41.4	6.12	13	+2.94	2.24	18	192
Nelson airfield	5	59.1	+0.7	76.0	36.1	3.21	7	+0.52	2.65	18	216
Blenheim	12	59.0	—0.9	89.4	34.4	2.48	10	+0.95	1.67	18	200
Hokitika	15	57.2	+0.9	70.0	38.1	7.90	16	—1.04	1.97	18	200
Hanmer	1270	56.0	—0.2	89.0	34.0	4.42	14	+1.06	2.41	18	192
Christchurch	22	57.4	—0.7	85.2	36.1	2.72	9	+0.78	1.11	18	176
Ashburton	323	58.8	+1.0	96.8	35.8	2.43	11	+0.23	0.80	18	184
Timaru	56	57.6	+0.2	82.2	37.2	1.24	12	—0.89	0.44	3	175
Alexandra	520	57.6	+0.0	87.8	31.1	0.28	5	—0.87	0.12	17	222
Taieri	80	55.0	—0.2	89.4	33.2	0.77	13	—1.30	0.24	19	162
Invercargill airfield	0	53.0	—0.8	80.1	28.9	2.36	19	—1.67	0.43	10	141
Chatham Islands	140	53.6	—2.8	67.4	36.0	3.97	22	+1.41	0.55	19	

Apiary Instructors Safeguard the Beekeeping Industry

NOBODY knows better than an experienced beekeeper how suddenly disease can appear, and how quickly it can destroy whole apiaries. Many can recall the careless or unfortunate producer who has suffered heavy losses, or who has even been forced out of business, through lack of attention to his bees.

Though the good beekeeper keeps a keen look-out for signs of trouble in his own apiaries, there may be disease present of which he is unaware, and of course he has no control over neighbouring apiaries from which disease can spread extremely quickly.

One duty of an Apiary Instructor of the Department of Agriculture is to inspect apiaries for signs of disease, and if he discovers it, he soon sees that prompt measures are taken to destroy the affected bees and combs and that the remaining hive equipment is sterilised by approved methods to prevent any further spread of the trouble.

In this part of his work the instructor has the fullest support of the beekeeping industry. Even a beekeeper on whose property disease is discovered usually appreciates only too well that the expense and loss incurred through taking control measures are very small compared with the results of allowing the disease to continue unchecked.

As their designation implies, Apiary Instructors are concerned with advising beekeepers on efficient apiary management and honey production. They are usually practical beekeepers before joining the Department and keep up to date with advances in beekeeping practices both in New Zealand and abroad. Newly established or inexperienced beekeepers look regularly to the Apiary Instructor for advice and progressive, well-established producers are usually keen to hear of new developments and techniques or of improvements on existing practices.

Instructors assist beekeepers by personal visits, by attendance at beekeepers' meetings, by conducting field days and demonstrations, by lecturing, and by writing practical articles in the "Journal of Agriculture".

The apiary instruction staff is not large, but vacancies do occur from time to time. Anyone with a good, practical background in beekeeping who is interested in this type of position is welcome to write for fuller information to the Director of the Horticulture Division, P.O. Box 1500, Wellington.

The Importance of Bush Apiaries in Beekeeping

By J. E. RODIE,

Apiary Instructor, Department of Agriculture, Hawera

IN most beekeeping districts in New Zealand there are bush areas which are readily available for the establishment of apiaries. Gradually through the years beekeepers have been discovering the value of bush apiaries financially and for the upkeep of their apiaries on clover lands.

HONEY bees as a rule need a considerable amount of supplementary feed throughout spring and early summer. For many years dry sugar and sugar syrup were fed, but in recent years the success of using bush honey for bee feeding has been recognised. Today many commercial beekeepers have one or more bush apiaries established for that purpose alone. Also in early summer some beekeepers find it advantageous to take brood and pollen from their bush apiaries after an early bush flow to boost their hives on the clover areas, so that those hives will be in good heart for the clover flow. They trust also that the bush hives will build up again in time to deal with the manuka flow. This, of course, applies only to the areas where there is a definite break between the two honey flows.

Some beekeepers who are fortunate enough to have bush apiaries in areas where there is *Lotus uliginosus* (*major*) and manuka have been producing section honey for sale. Due to good beekeeping practice and heavy flows these sections are of good quality in regard to uniform weight, and have very little if any travel stain. They have been finding a ready market in New Zealand for some time.

Type of Bee

Most beekeepers prefer to work hives of Italian bees and have used them when they have established their bush apiaries. Because of the difficulty of pure mating they usually requeen with nucleus, in this way keeping the strain pure. Dark-coloured bees are not favoured, as most beekeepers find them difficult to work because of their fierceness and their running hither and thither on the combs. Smoke appears to accentuate this peculiarity.

Some beekeepers, however, prefer to keep a hybrid strain in their bush apiaries. One beekeeper who had a bush apiary had always requeened with Italian queens, but one season because of pressure of work he did not have the opportunity to requeen on schedule. It was noticed the following season that some hives had gained new queens because of swarming, etc., the previous season. These queens were producing hybrid stock, so it was decided to leave them for the season. The amount of honey produced that season from the hybrid bees was exceptionally good. The following season the result was the same. The beekeeper therefore decided to run hybrid queens in his bush apiaries and has found that they are producing a superior crop in bush and manuka areas and are quite good to handle provided the queen is kept to a first cross.

Suitability of Location

Most important in the production of bush honey is the location of the apiary. Where possible, apiaries should be situated in a well-sheltered

HEADING PHOTOGRAPH: Apiary in a position to take advantage of early native bush nectar sources.

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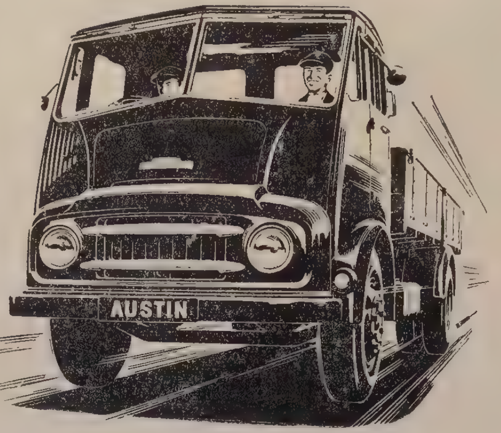

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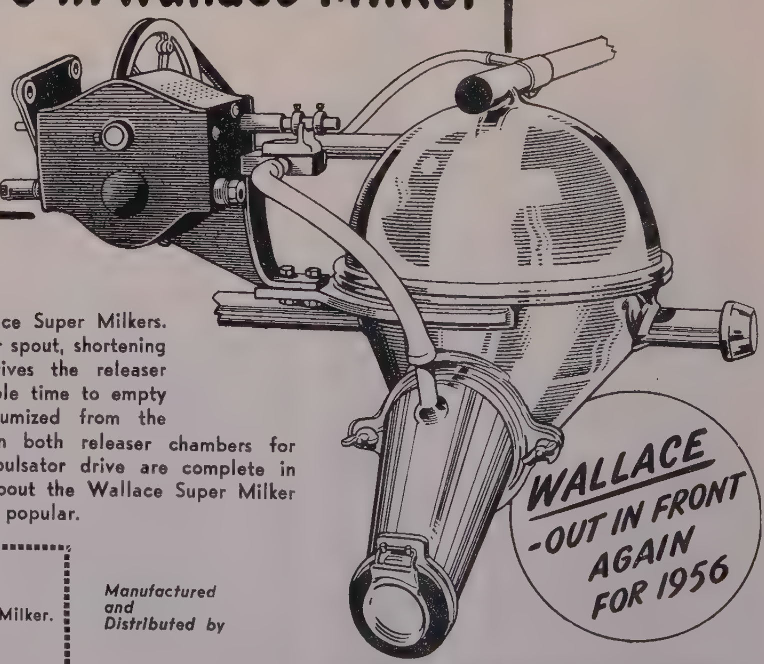

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position. If manuka honey is the aim, care should be taken to see that the site chosen is suitable, not only for that particular honey, but also for native bush honey if possible. The bush will provide an early flow and will be most helpful in building up the bees for the manuka flow.

In the southern part of Hawera district, early bush flows of nectar can be expected from five finger, Maori privet, and kowhai from September onward. Usually there is a light flow from Maori privet (*Geniostoma ligustrifolium*) in this area, and this surplus is taken from the bush hives in early November. The combs of honey can then be used to feed the hives of bees on the coastal areas in readiness for the clover flow, which usually begins in early December. The manuka flow in the above district begins early in December and a worthwhile crop is nearly always harvested.

Bush apiaries in northern Taranaki are fortunate in that they experience an early flow from kamahi, which in this area is usually the main bush flow. The flow begins in November and is aided by light flows from other early bush sources. Beekeepers who wish to take advantage of this early flow can remove any surplus and immediately feed it to their hives on clover areas, which then have the opportunity of building up on this feed honey, enabling them to be in good heart for the main clover flow, which in this area begins about mid-December. Bush areas in north Taranaki cannot as a rule be relied on to produce a major crop of manuka honey and the kamahi flow is usually depended on to provide any surplus feed stores for the following spring.

A mistake which should not be made is to place hives anywhere at all in a valley which has acres of manuka every so often. Results from apiaries situated like this have been compared year after year with other apiaries situated right beside the manuka. It has been noticed that manuka produces a larger crop. This is understandable, as when bees have to fly over high, razor-backed hills to gather a crop the slightest wind must affect them and the hives which are situated right beside the manuka do not have these difficulties to overcome, even though the bees from time to time do not seem to be working the flowers close to home.

Harvesting and Storing Feed Comb Honey

Some beekeepers remove the manuka crop from the hives and store it in the combs. Others strip their hives on the clover areas of all their honey and use manuka honey to make up their winter stores. In this way very little clover honey is left in the hives. There appears to be nothing wrong with this practice financially, as returns are higher, but it does increase costs due to extra mileage and work involved. Also there is the risk of underestimating the needs of the bees if a bad spring occurs the following season, when artificial feed may have to be used. When feed honey is stored in the honey house it should be placed over drip trays, with hive lids on top of the supers to keep out mice and rats.

Well-sheltered bush apiary close to manuka scrub.

The problem of feed honey tending to granulate in the comb arises from time to time, but there is really no need for concern, for when it is fed to the bees they will convert most of the granulated honey and it will be noticed that during the operation of reconverting, the bees will drop small amounts of residue on the floor board.

Fermentation is liable to cause trouble to the beekeeper who is inexperienced or careless. When manuka feed honey is removed the only combs to be stored should be fully capped or nearly so. Any uncapped honey which is surplus to the feed-producing hives and must be removed should not be stored but may be fed to nucleus or other hives in need of it. If one does get caught later with some supers of honey showing signs of fermentation and the amount warrants it, it is best to pick out five or so strong colonies in each bee yard near home and feed half-a-dozen combs to each. Under no circumstances should this honey be fed to weak hives. In a few days it may be noticed that the hives of bees that have been fed the honey will be affected with dysentery. If the mortality tends to be high, the combs should be removed and may be placed on other strong colonies to be cleaned up. This treatment is drastic and it is up to the beekeeper to decide whether he carries it out or boils the combs down for wax.

Disease Factor (Foul-brood)

Disease control is most important in the operation of bush apiaries. It must be remembered that combs of honey from these apiaries are distributed throughout other apiaries and one case of disease alone can cause great losses. In spring and also before the honey crop is removed a definite check should be made for foul-brood. Also when the hives are worked at any time a watch should be kept and any honey on a diseased hive should be destroyed along with the bees and combs.

Advantages

Carefully attended bush apiaries are an asset to the beekeeper. Bees take to combs of feed honey far more readily than they do to dry sugar or sugar syrup. This is quite understandable, as it is their natural food. There is quite a mortality rate when dry sugar or sugar syrup is fed to bees, as they are faced with the problem of converting it to a suitable condition for their use. This extra work puts a heavy strain on the bees. Another factor is that combs of feed honey can be fed out quickly and efficiently.

If beekeepers wish to establish bush apiaries, they should consult their local Apiary Instructor, who may know of suitable localities which are vacant.

[Next month another article will discuss the effects of weedicides on a number of valuable nectar sources.]

Trees on the Farm

Planting Problem Areas

TREE planting was described in general terms in last month's article. There are, however, problem areas where the technique must be modified to suit special conditions, as for instance in pure sand, in frost hollows, and in swampy areas. This article by W. H. Jolliffe, Forestry Extension Officer, New Zealand Forest Service, should assist the owners of such difficult sites to get them established in trees.

SAND DUNES

BEFORE trees can be planted in sand it must be stabilised by the growth of plants that thrive in sand so that the young trees will not be overwhelmed or exposed by subsequent sand movements. If the area borders the coast, the first work will be the building of a protective barrier—the foredune—with brush fences parallel to high-water mark. When the first row becomes buried with sand another fence a little further back is erected and so on until the dune reaches a height of 15ft. to 20ft.

The next step is the planting of marram grass. Spacings of 2ft. x 2ft. to 4ft. x 4ft. are used, depending on the degree of exposure to wind. Planting stock is dug from 2- or 3-year-old clumps, trimmed with a sharp spade to about 12in. long, and tied into convenient-sized bundles. Into each spade hole about three rooted pieces are inserted and well heeled in. Planting on dunes is done on contours and not in straight lines to avoid the formation of wind funnels, but this precaution is unnecessary on moist flats.

Sowing of Lupin

In exposed situations the planting of marram grass should be accompanied or followed by the sowing of yellow lupin seed. This legume combines with the marram grass to form a very dense protective cover and at the same time it enriches the soil by the addition of nitrogen and humus. As inclusion of yellow lupin makes later preparation for tree planting more difficult, use of lupin should be restricted to where it is essential.

Once planting of a sand area has begun all stock must be kept off it. Later, fire becomes the chief menace to reclamation work, especially as dunes have come to be regarded as public playgrounds. In addition to watchfulness against trespassing stock and the outbreak of fire it is necessary to inspect the area regularly for any blowouts after heavy winds. Gaps must be plugged with short lengths of permeable fence before they can develop into major rifts, which can undo a lot of painstaking work.

Tree Planting

Two to 4 years after the planting of the marram grass the sand should be sufficiently stable to permit tree planting with safety. The amount of profitable tree growth depends on the degree of protection from strong, salt-laden winds afforded by the foredunes. Along the west coast of the North Island there is always a belt of varying width where the trees or shrubs are purely protective and not likely ever to have a timber value. Some trees or shrubs which are useful in this belt are ngaio, taupata, boxthorn, tree lucerne, and silver poplar.

Not many species of timber trees will tolerate salt-laden winds. The most tolerant of those ordinarily used in New Zealand is macrocarpa (*Cupressus macrocarpa*). Others which can be grown are radiata pine (*Pinus radiata*), Corsican pine (*P. laricio*), and *Robinia pseudacacia.*

FROST HOLLOWS

In flat country not subject to frequent winds frost accumulates in any hollows. Many species of timber trees planted in such sites, that have come to be known as frost hollows, have been so often checked by frost that they develop a bushy habit.

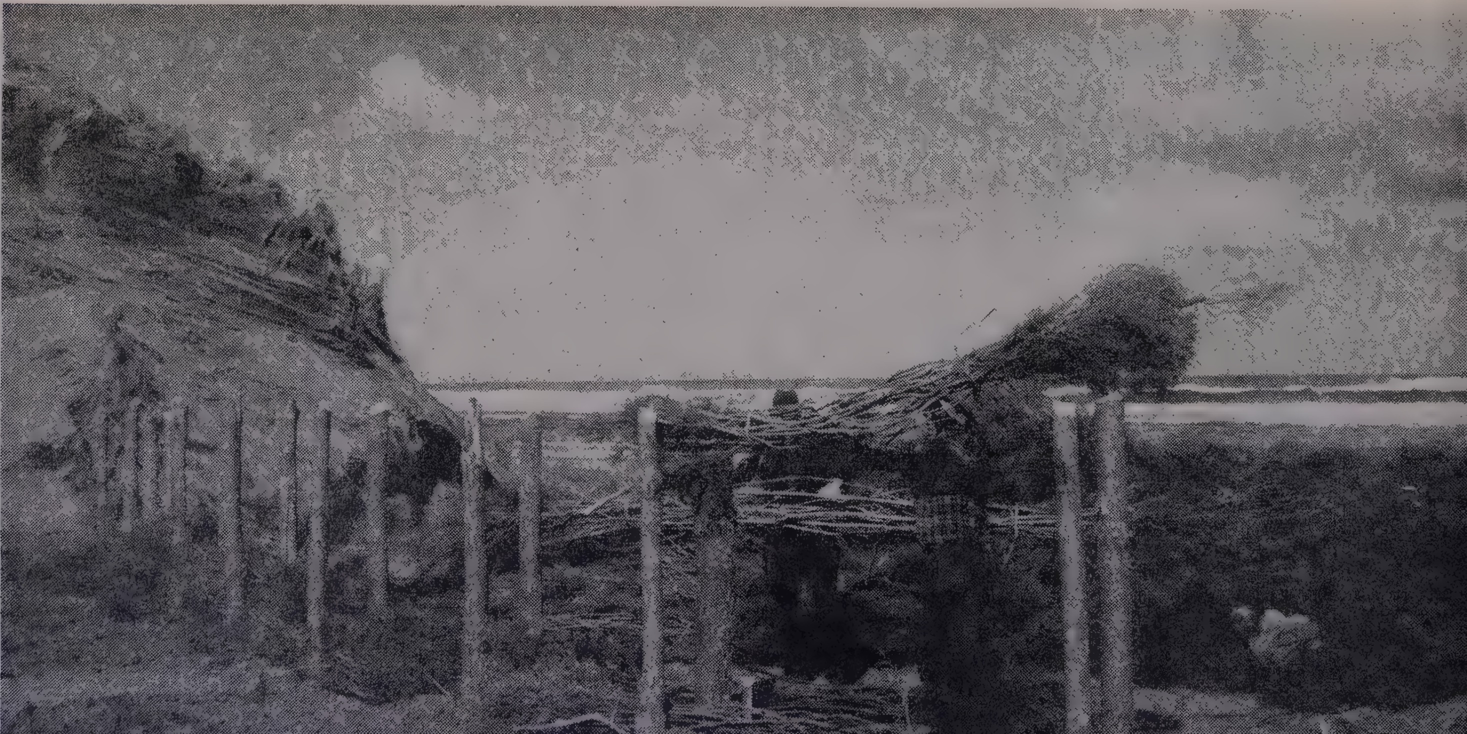
To afforest these hollows it is necessary therefore to choose frost-resistant species. *Pinus ponderosa, P. murrayana,* and *P. laricio* are the most hardy in this respect among the pines, while willows, poplars (especially the later-leafing kinds), and *Robinia pseudacacia* are worth while both in themselves and as nurses to protect more susceptible species.

SWAMPY AREAS

Since the majority of trees will not tolerate "wet feet", the best preparation for the planting of swamps is thorough draining. Where this is not possible the water level can be progressively lowered by the absorption of water by trees planted alongside.

The most useful species to plant round the edge of a swamp are: Swamp cypress (*Taxodium distichum*), *Sequoia gigantea (wellingtonia)*, alder, willow, and poplar. As the swamp dries out it will be possible to continue planting inward until much, if not all of it, is reclaimed.

Repairing a gap in a foredune by the erection of a permeable scrub fence. National Publicity photo.



▲ The country on which the trial was conducted. The white square (in circle) is on the site of the trial.

Raglan Hill Country Improved by Oversowing and Topdressing

By H. McM. BULL
Instructor in Agriculture, Department of Agriculture, Hamilton

THE parallel development of two identical hill country pasture improvement trials in Raglan County over 4 years in one case and 6 years in the other provides an excellent example of pasture changes to be expected from regular applications of fertiliser and the introduction of clover seed. Though on different soil types, the pastures were similar being especially chosen for their complete lack of clovers in a harsh sward of browntop danthonia, sweet vernal and ratstail, typical of steep non-fertilised hill country.

SEEDING rates per acre were as follows: Kentish white clover 2lb., pedigree white clover 2lb., Mt. Barker subterranean clover 3lb., Tallarook subterranean clover 3lb., and *Lotus uliginosus* (*major*) 1lb., broadcast separately in bands ¼ chain wide by 1¼ chains long across the face of the slope with a control strip on which no seed was sown. This seeded area was cross dressed with serpentine superphosphate at the following rates in bands ¼ chain x 1½ chains: 3cwt., 1cwt., 4cwt., and 1cwt. plus an initial dressing of 1 ton of lime. A non-fertilised strip was left in the centre for control. These applications of phosphate were made annually, with the exception of the 4cwt. dressing, which was not repeated. Stock, particularly sheep, grazed the trial areas hard and often practically throughout the year, creating conditions that gave the subterranean clover little opportunity for vigorous reseeding.

Subterranean Clover Appears

In the first year plants of Tallarook and Mt. Barker subterranean clover could be observed, the latter being the more vigorous. No Kentish white clover or pedigree white clover seedlings appeared, which suggested that fertility was as yet too low. Some *Lotus* appeared, but the origin (whether introduced or self-sown) remained uncertain.

Throughout the second year Tallarook and Mt. Barker subterranean clover held their own despite severe restrictions through hard grazing at seeding time. Results of fertiliser applications were becoming apparent, especially on the area which received 3cwt. and on the area which received 1 ton of lime.

Kentish White Clover and *Lotus*

In the third year Kentish white clover became established. *Lotus* too was prominent, either introduced or self-sown. Pedigree white clover still failed to overcome the existing fertility conditions. Mt. Barker subterranean clover, now in its third year, showed a tendency to fade out, whereas Tallarook showed improvement.

The fourth year showed further establishment of Tallarook and *Lotus*. Kentish white clover was slowly consolidating a foothold, whereas pedigree white clover, either owing to a poor initial establishment or to low soil fertility, failed to make any appreciable progress.

In the fifth and sixth years *Lotus* and Tallarook subterranean clover continued to make good progress. Mt. Barker subterranean clover had practically disappeared and pedigree white clover was of little value. Kentish white clover by this time had become firmly established. Much volunteer

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white clover appeared on all treated plots, demonstrating the steady rise in fertility due both to the topdressing and to the increased amount of droppings through sheep grazing the area in preference to the adjoining pasture.

Influence of Lime

Fertiliser responses over the closing years of both trials revealed an unexpected similarity. There did not appear to be any great differences between annual applications of either 1cwt. or 3cwt. of serpentine superphosphate as far as clover growth was concerned. In the sixth year of one of these trials the diminishing effect of the original dressing of 1 ton of lime began to be apparent. However, there is no disputing the fact that where it is practicable to apply lime on these soil types its influence is considerable in not only promoting a more rapid and dense growth of clover species, but in assisting them to flourish longer under dry conditions.

Left—An area which has had no seed or fertiliser. Right—*Lotus uliginosus* (*major*) after the area had received six annual applications of 3cwt. of serpentine superphosphate per acre.

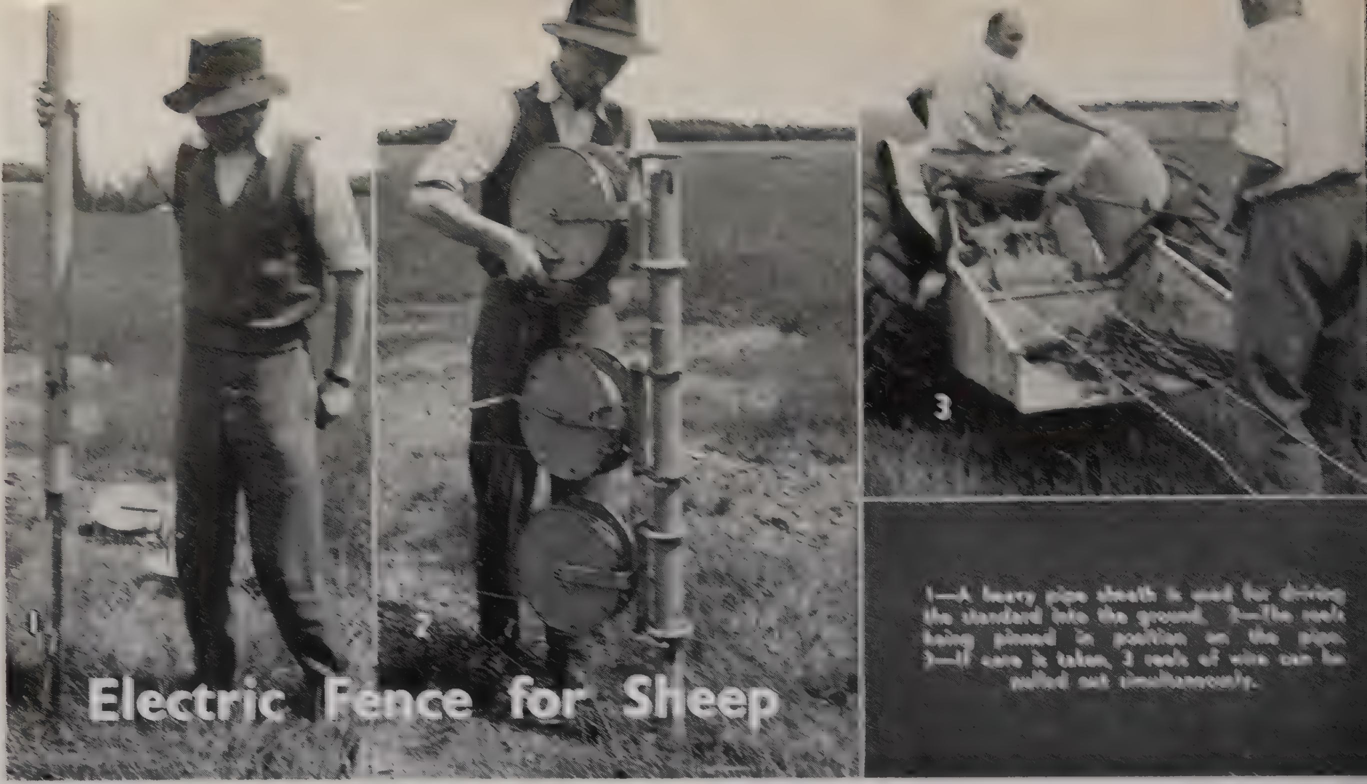
These trials demonstrated that clover can be introduced under adverse conditions provided a certain amount of fertiliser is applied. The addition of lime still further improved the general appearance, colour, and vigour of the various clover species. Tallarook subterranean clover was superior to Mt. Barker subterranean clover, possibly because it comes into leaf later than Mt. Barker when more alternative feed is about, is a more vigorous seeder, and has a more prostrate growth. Kentish white clover demonstrated its ability to thrive and flourish under adverse conditions, and on account of its tight, prostrate growth stands up to continual close grazing.

Upper—An area which has had no seed or fertiliser. Lower—Tallarook subterranean clover after the area had received six annual applications of 3cwt. of serpentine superphosphate per acre.

This area has received no seed, but has had six annual applications of 3cwt. per acre of serpentine superphosphate. There is a complete absence of clovers other than *Lotus uliginosus* (*major*).

Pedigree white clover did not show any degree of prominence until the third year, when regular fertiliser and stock droppings had raised the fertility of the area. From then on white clover either introduced or volunteer appeared in nearly all plots.

Had grazing management permitted the natural reseeding of subterranean clover, a very much quicker and stronger establishment of Tallarook and possibly Mt. Barker would have taken place.



1—A heavy pipe sheath is used for driving the standard into the ground. 2—The reels being pinned in position on the pipe. 3—If care is taken, 3 reels of wire can be pulled out simultaneously.

Electric Fence for Sheep

By G. R. MOSS
Fields Instructor, Department of Agriculture, Wanganui

AN electric fence can be moved with little effort and cost and it may be this reason [illegible] has a place on most farms today. The single-wire electric fence is proving a valuable part on most dairy farms, but it has not proved satisfactory for the control of sheep. Sheep are liable to go under a single wire, as their wool, especially when dry, insulates them against the shock. A group of farmers and manufacturers in the Rangitikei area have been experimenting with a 3-wire electric fence for sheep and have found a practical solution to previous problems.

AN iron standard with a foot is driven into the ground by a heavy pipe sheath, and standard and pipe form a unit on to which 3 reels 11in. in diameter are pinned. The reels are supported by loops made of mild steel which are insulated by polyethylene tubing. The reels are fitted with handles for winding the wire. A metal locking pin is used to hold each reel in position to stop the wire unwinding. If care is taken, the wires from the three reels can be pulled out simultaneously.

Intermediate supports for the fence are ¼in. diameter steel stakes 47in. long with a foot bend 9in. from the bottom. The insulators are very simple, being 3in. lengths of ½in. diameter polyethylene piping in which two holes are bored. One hole takes the ¼in. stake and the other (3/16in. in diameter) takes 14-gauge galvanised wire. A hacksaw cut is made to the small hole to slip the wire in. These insulators are efficient, easy to make, very cheap, easily attached, and readily adjustable to any height.

The three wires are sometimes electrified, though good results are being obtained by earthing the middle wire. This gives a greater shock, because there is a higher potential from a live wire to an earth wire than between a live wire and the ground.

Under good conditions an electric fencing unit, using number 14-gauge wire, should be effective for at least 7 miles. The effectiveness depends on the resistance of the earth return, leakage across wet or dusty insulators, and other variable factors. If the voltage in the wire is too high, there is a tendency to get a jumping spark across insulators, with a consequent loss of efficiency.

Costs

The basic cost of items such as batteries, the master unit, etc., is fixed regardless of length of fencing up to the point where one unit is still effective. The more use that is made of each master unit the lower the cost per chain will be.

In the costs given below (typical of those at 1 December 1955) 1 mile of electric fencing costs just over twice as much as 10 chains, yet there is 8 times as much fencing.

FIXED COSTS

	£	s.	d.
Master pulsator unit with stand [illegible]	[illegible]	[illegible]	[illegible]
*2 batteries [illegible]	8	10	[illegible]
*Battery charger [illegible]	8	7	6
Hydrometer		16	[illegible]
Triple reel, pipe, standard and footing stake	8	12	6
3 porcelain insulators		[illegible]	[illegible]
	£59	1	6

VARIABLE COSTS

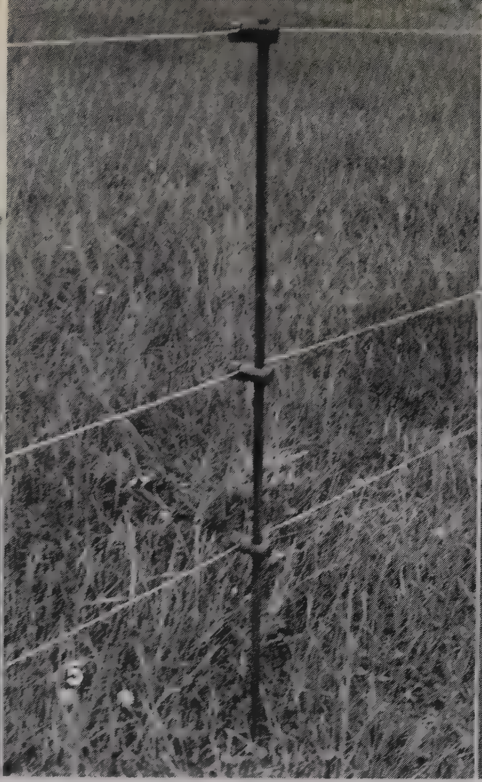
10 Chains of Fencing (220yds.)

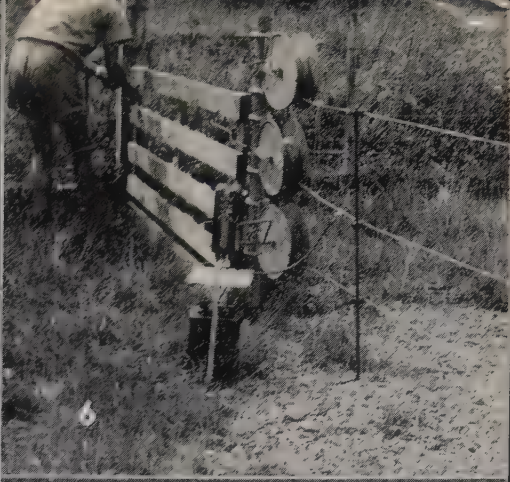
	£	s.	d.
Stakes, 28 at 3s. each (one per 8yds. for sheep)	4	4	0
Insulators, 84 at 7d. each (made from polythene piping at [illegible] a foot)	2	9	0
Wire (14-gauge galvanised, triple wire fence requires 660yds.; [illegible] coil ([illegible]yds.) costs 7s. 6d. to 10s.; 5 coils at average cost of 8s. 9d. a coil)	2	3	9
	£8	16	9

1 Mile of Fencing (1760yds.)

	£	s.	d.
Stakes, 220 at 3s. each	33	0	0
Insulators, 660 at 7d. each	19	5	0
Wire (single-wire fence requires 5280yds.; 1cwt. coil (2136yds.) costs £4; 2 of these coils and the balance in 7lb. coils at 8s. 9d. each)	11	1	3
	£63	6	3

*If the battery and battery charger are purchased as a unit with the master pulsator, they are exempt from the 20 per cent. sales tax. This applies only to the first battery purchased.





4—The stakes are pushed into the ground by stepping on the footing bend. 5—The insulators are made from polyethylene piping. The wire spacing shown is for the control of both sheep and cattle. 6—A gate can be wired up between the electric fence unit and the adjoining fence.

Battery Maintenance

A 6-volt electric battery when used continuously may have to be charged every 2 to 6 weeks. It is advisable to replace the battery with a freshly charged one at regular intervals. The life of a battery is reduced if it is allowed to become fully discharged or overcharged or if the plates are not kept covered with distilled water.

There are three ways in which a farmer can tell when a battery requires charging. The simplest way is to use a hydrometer to obtain the specific gravity of the acid solution. A 6-volt battery requires charging when the specific gravity of the acid falls to 1.150. It is fully charged when the specific gravity is as follows:—

Reading	Temperature degrees F.
1.290	55
1.285	68
1.280	80

A voltmeter is more accurate than a hydrometer, but costs more. Provided the cells are not faulty, the voltmeter gives a good indication of the battery condition. A 6-volt battery giving a reading below 5½ volts should be charged. A fully charged battery gives a reading of 6.15 volts.

A third method of checking a battery is simple, but not very accurate, and with some types of master unit may be misleading. It consists of judging the pulse speed of the master unit. When the battery has been discharging for some time and is beginning to run down, the pulse speed of some units increases. When it is obvious that pulsating of these units is more rapid the battery should be charged.

It is advisable for the farmer to purchase his own battery charger, as a charge can be carried out for a cost of about half a unit of electricity. This is very cheap compared with the cost and trouble of taking a battery to town for charging.

A battery should be charged every 6 weeks whether in use or not, as it is constantly discharging. A safe charging rate is 1 ampere per positive plate per cell. For example, a 5-plate electric fence battery has 2 positive plates per cell and should therefore be charged by a 6-volt, 2-ampere battery charger.

Evaluation

A feature of the type of electric fence described is that the wires can be adjusted readily, depending on the height of the crop or pasture and the topography of the paddock. If the grass is high when the electric fence is erected, the bottom wire should be placed high. After sheep have cleaned out under the fence it should be lowered to about 9in. from the ground; a spacing of 9in. between wires is satisfactory for sheep. If cattle and sheep are run together, the top wire should be raised to 18in. above the middle wire.

On many sheep farms where high cost limits permanent subdivision the electric fence can be used to give more intensive pasture control and to break feed crops. It is being used with success on hill country to subdivide large paddocks temporarily into workable areas for discing up and sowing down to new pasture. By this method gullies and unworkable areas are not lost from grazing.

The large paddocks on many sheep farms often make difficult the closing up of an area for hay or silage. By use of the electric fence such paddocks can be subdivided for haymaking and grazing at the same time.

Limitations

The electric fence has disadvantages. Unless an indicator has been fitted, the first intimation that the unit is not working is when stock break through the fence. Constant inspection for earthing of the live wire by means of a neon tester is required and regular maintenance and replacement of batteries are essential. Problems associated with electric fences for sheep are gradually being ironed out and flashing devices are being designed to indicate whether the fence is operating.

The electric fence is an asset when used by a farmer who fully understands its mechanism and limitations. It has outstanding potentialities on suitable rolling hill country for intensive pasture control, provided the stocking rate is heavy enough to prevent earthing by rank growth. A substitute for high-priced subdivision is more than welcome to farmers breaking in new blocks of land and this type of fence should be worthy of consideration.

Acknowledgments

Acknowledgments are made to Messrs. R. O. Williams, W. Griffiths, and J. H. Arkwright, of Marton.

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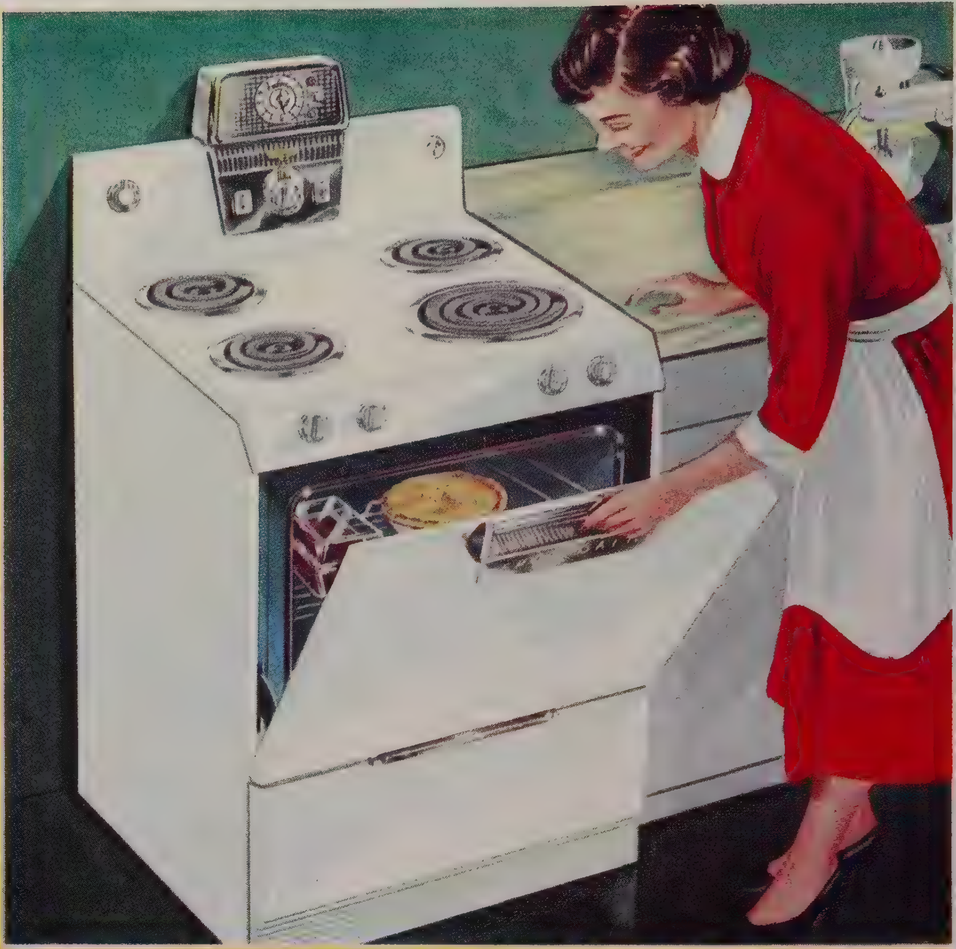

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Danger of Rabbit Baits to Livestock

By I. G. McINTOSH,

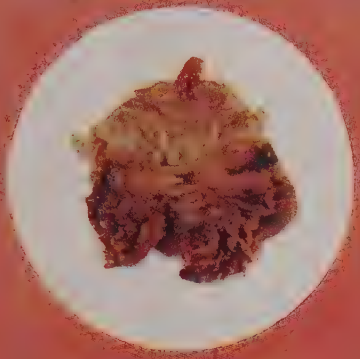
Toxicologist, Department of Agriculture Animal Research Station, Wallaceville

IN New Zealand poisoning is the most important weapon in rabbit destruction. Though myxomatosis has been used to infect rabbits at many points in New Zealand, the disease has failed to spread as it has done in Australia and Europe. If there were an ideal poison, that is, one which would kill rabbits but no other animals, the task of reducing rabbits would be greatly simplified. Such a poison is not known and it is necessary to use the practicable poisons in such a way that losses of sheep, cattle, and dogs are kept to a minimum. At times very serious losses of stock do occur and this article discusses the dangers of the various poisons used and how losses of animals can be avoided or minimised.

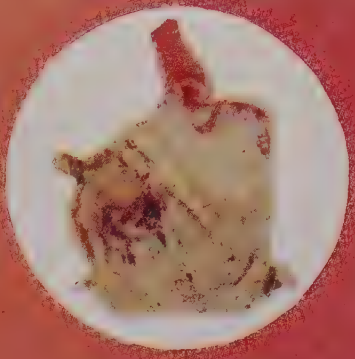
IT is not possible to give a list of times after which various poisons laid in the field will be safe for stock. Though a certain amount of work has been done, information on the field deterioration of baits through weathering is limited.

Before rabbit boards were obliged by legislation to adopt the policy that became known as the "killer" policy—under which boards actually killed rabbits on behalf of ratepayers—most private rabbiters had been satisfied to obtain low-grade kills; that is, to kill enough rabbits to keep themselves busy skinning them and preparing the skins for sale.

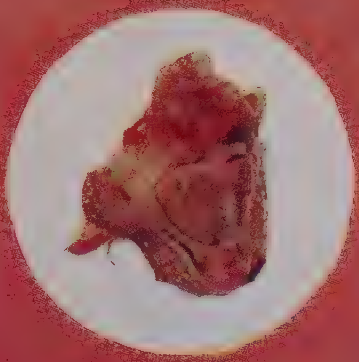
With the obvious advantages that the killer policy has brought it has



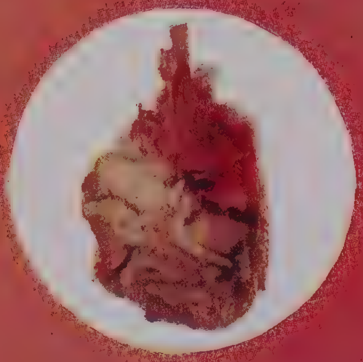
Normal stomach of a rabbit.



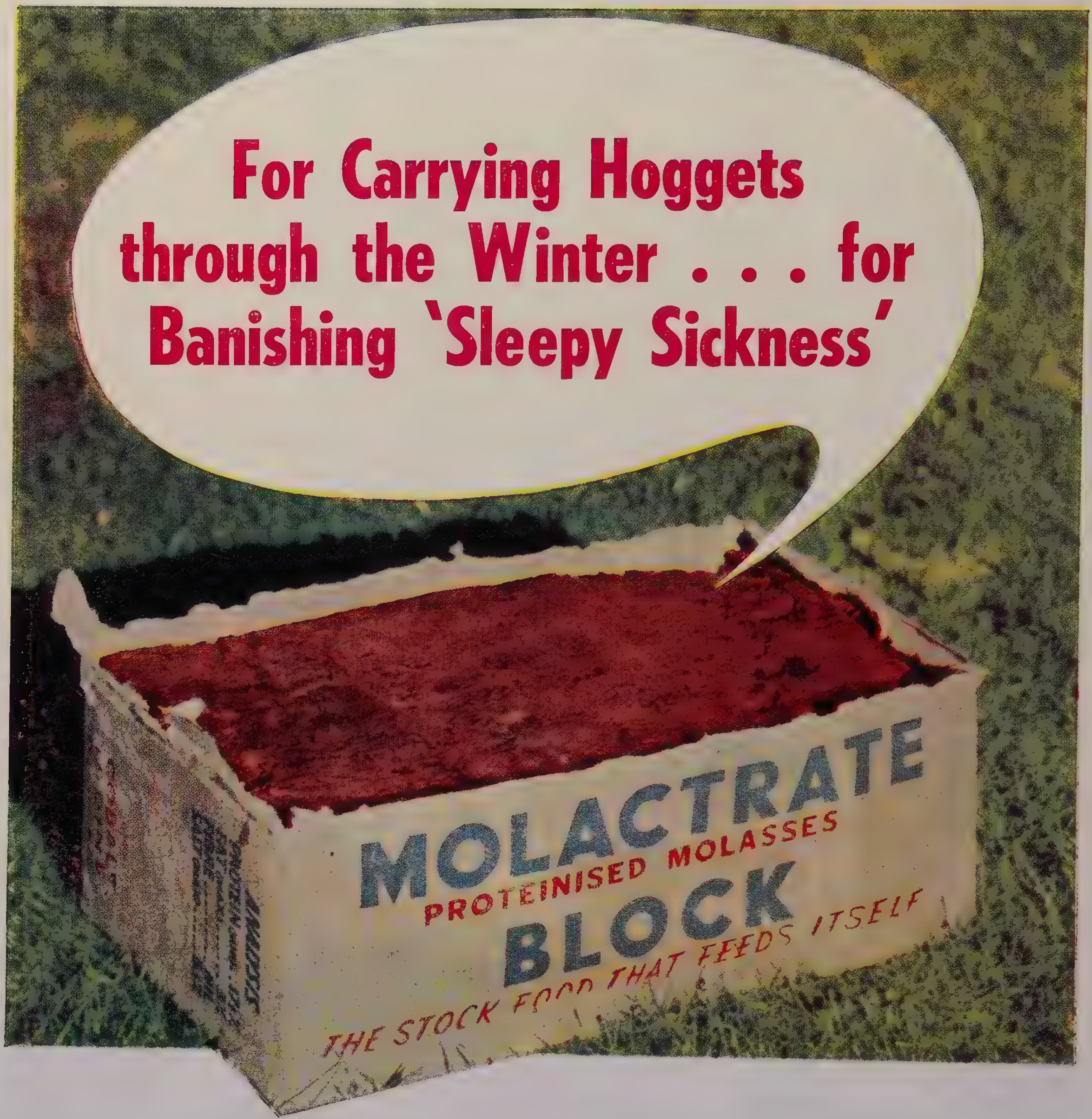
Absence of gastritis in stomach of rabbit which died about 2½ days after dosing with 1/1000oz. of white arsenic.



Gastritis (indicated by inflammation) caused by 1/875oz. of white arsenic. The rabbit died about 2½ days after dosing.



Gastritis caused by 1/438oz. of white arsenic. The rabbit died about 2½ days after dosing.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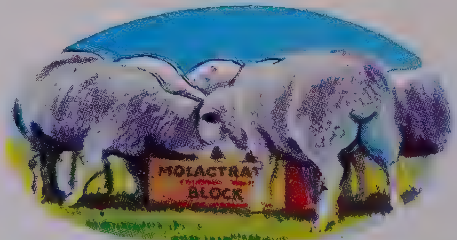
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become necessary to look closer at the way the standard poisons have been used and to think about possible new and more efficient poisons. Not many years ago it was customary to regard a 40 per cent. to 60 per cent. kill as satisfactory, but now the objective should be at least a 95 per cent. kill.

Phosphorus

Wallaceville's first entry into the rabbit poisoning sphere was in 1947 after complaints had been received about the phosphorised pollard poison produced by the Frankton mixing depot. Phosphorised pollard will be discussed first, because phosphorus is the only practicable poison that can become non-poisonous through exposure to air. It will be necessary to discuss manufacture and distribution to rabbit boards of the pellets because these matters are closely allied with the effectiveness of the pellets used against rabbits and the required deterioration of the poison if stock losses are to be avoided.

In 1947 the process used at Frankton was examined and it was found that about 90 per cent. of the added phosphorus was being lost during manufacture. The reasons for this were found and the process improved. Next, it was discovered that there were grave losses of potency during storage of phosphorised pollard that was good at the time of manufacture. As little as 3 weeks' storage was sometimes sufficient to render otherwise good pollard useless for poisoning rabbits. The factors responsible for this deterioration are still not known.

At that time no one knew how much phosphorus would poison a rabbit or a sheep, so these amounts were determined. In the Animal Research Division it was laid down as a working criterion that phosphorised pollard pellets should each contain a lethal dose for a rabbit. The dose for a 3½lb. rabbit is about 7 mg. of yellow phosphorus (4000 rabbit doses to 1oz. of the poison). This means that pellets of 2½ gm. (11 to the ounce) must contain 0.28 per cent. of phosphorus to be considered effective. This percentage must be present at the time the pellets are put in the field.

Losses of potency during mixing and storage of the pellets can be offset easily by putting in a lot of phosphorus and this has been and is still being done, but the variable keeping quality during storage and in the field makes this practice extremely undesirable owing to the dangers to other stock.

When the effects of phosphorus on sheep were examined it was found that they were about four times as sensitive as rabbits to the poison when equal body weights were considered. This meant that if a pellet containing 0.28 per cent. of phosphorus would kill a 3½lb. rabbit, 7 pellets of the same strength would kill a sheep weighing 100lb.

Storage Losses

As far back as 1947 coarse pollard obtained in the preparation of high-extraction flour was blamed for the poor poison being turned out from Frankton. Actually the poorness was due to an unsuitable mixing technique and overlong mixing time. This overlong mixing time had been brought about by the difficulty of preparing a good dough suitable for pelleting from the pollard then available. This difficulty could be readily overcome by mixing the pollard, water, and sugar for some time and then adding the phosphorus and mixing only long enough to distribute the phosphorus through the dough.

Subsequent work showed that pellets made from both coarse and fine pollard were subject to variable losses in storage, but it could not be said that either could be relied on to give a product that would keep well.

Retention of Potency in the Field

Evidence accumulating over the years is showing that pellets made from fine pollard do tend to retain their phosphorus unchanged if they are subjected to baking by hot sun within a day or two of laying. The fine pollard tends to bake into a hard coat impervious to air and when the pellets are freshened up by rain they are eaten by and are poisonous to sheep. Coarse pollard on the other hand tends to give an open texture, allowing access of air which causes the phosphorus to deteriorate to the non-poisonous form.

The amount of molasses, sugar, and jam incorporated in pellets has a bearing on their keeping quality in the field. If the quantity of sugars from these sources is large, the pellets tend sometimes, but only sometimes, to form the same sort of air-impervious coat as with fine pollard, but high sugar content probably does not have the same influence as fine pollard.

Climatic conditions play a part in retention of potency. When pellets are kept continuously moist by light rain they tend to retain their potency in the field. Heavy rain does, of course, break the pellets down mechanically. Alternate sun and rain, provided there is no baking and formation of impervious coat, tend to give a quicker deterioration, and continuous dry conditions give the slowest breakdown of all. These are generalisations only and there are anomalies in the weathering trials that have been carried out.

Now what does all this lead to?

A pellet is sought that is potent against rabbits for about 3 days from the time of laying and which will then deteriorate rapidly. The high-phosphorus pellet which remains potent for 3 months either causes losses of sheep or prevents restocking for inconveniently long periods, thus seriously interfering with good farming practice. It is known how much phosphorus will poison a rabbit and the losses normally occurring in any particular mixing process can be determined, provided of course that a rigidly standardised procedure is used. Something is also known of the influence of fine and coarse pollard on time of deterioration of the poison in the field.

It must be obvious that any central mixing depot cannot fulfil the above conditions, unless poison can actually be laid within a very few days of manufacture. This is usually not possible, owing to transport difficulties and the necessity for rabbit boards contemplating aerial droppings to be certain of having supplies on hand to suit aerial operators. Hence the only alternative is to mix pellets on the spot and use them immediately.

Suitable Pellets Being Produced

Now what about the practicability of the type of pellet that has been discussed? The foreman of the East Wairarapa Rabbit Board, Mr. H. McLean, has co-operated closely with Wallaceville during the past 4 years and is making a product which meets all the conditions. He has been in trouble with stock losses only when he has been forced to use fine pollard.

Briefly he melts the phosphorus in hot jam and with a mechanical stirrer breaks the molten phosphorus into very fine particles which remain permanently suspended in the jam. The preparation of the phosphorised jam is a little tricky and requires practice to avoid firing of the particles of phosphorus, but that is just a matter of correct equipment and experience. He dissolves molasses and sugar in 1 part of hot water and adds this to 3 parts of cold water. One-third of the pollard goes into the mixer, then the solution of molasses and sugar, and this mixture is made into a paste. The phosphorised jam is added and then the rest of the pollard. Mixing is continued for not more than 8 minutes before the pellets are extruded and dusted with pollard. They are aired on a floor overnight, sieved, put into tins, and used immediately. This is a cold mix process and the loss of phosphorus during mixing is smaller than with a hot mix. Some people believe that cold mixing induces souring in pellets, but this is not certain. In any case the question of souring does not arise, since the pellets are used immediately.

Field deterioration of these pellets to safe levels for sheep normally is complete in 3 weeks. There is a very good case for this on-the-spot mixing as opposed to the use of central mixing depots. It is felt that the only use for central mixing depots is in the preparation of phosphorised jam, which is quite stable in storage.

Phosphorised Jam

Now what about phosphorised jam as a rabbit and sheep poison? There is already some evidence from a trial in the Wairarapa that phosphorised jam is a better poison that 1080 in jam. Both phosphorus and 1080 will remain until the jam is worked out by rain. With the ordinary technique of laying jam on spits or in a furrow there is really no problem about poisoning stock, since turning in the spits or furrow is a simple process and practicable in terms of labour required. It allows immediate restocking with absolute safety.

If properly handled, phosphorus can still occupy a high place among the poison weapons both in effectiveness against rabbits and in safety to stock. **It should not be abandoned lightly.** Trials to assess the relative efficiencies of phosphorus pellets and 1080 pellets are needed.

Arsenic Poisoning

Powdered white arsenic, particularly in carrot, has proved to be a highly effective poison in the South Island. The toxicity of the powder depends on its fineness. No checks on the fineness of various batches that have come into New Zealand have been done, but rabbit boards should order impalpable powder; that is, powder which cannot be felt when a pinch is rubbed between the fingers. Such a powder has a toxicity to the rabbit about a half what it would be if it were dissolved in soda. Since rabbits do not like arsenic so dissolved, the very fine powder is a good substitute.

The toxicity to the sheep is the same as to the rabbit when equal body weights are considered. The powder does not decompose in the field and it does not dissolve in cold water, so there can be no leaching of the poison from baits by rain. After the field use of this poison decomposition of baits is the only way in which stock losses can be avoided. To get rapid decomposition of carrot baits far more attention should be paid to the chopping of carrots into fine flakes. Many choppers turn out far too many lumps of up to ½in. thick. Such thick lumps decompose only slowly.

There is reason to believe that the level of arsenic used with carrot in the South Island is far too high.

Some experimental poisonings have been done recently at Wallaceville, using a very fine powder sold commercially for rabbit poisoning. The illustrations on page 435 show the extent of gastritis (inflammation of the stomach) produced in rabbits by quite low lethal dose levels. A 3½lb. rabbit was killed in approximately 50 to 65 hours by 28 mg. of the powder (1/1000oz.). A lower dose did not kill. When 64 mg. of powder (1/438oz.) was used on a similar-sized rabbit the time until death was about the same as for the 28 mg. dose.

With the normal South Island level of 8oz. of white arsenic to 20lb. of chopped carrots (1 kerosene tin) many dead rabbits are usually found after the first night, indicating death in not more than 16 hours. The degree of gastritis is far higher than that indicated in the illustrations and even in rabbits found dead some days after poison has been laid the degree of gastritis is far greater than anything obtained experimentally. Usually the whole stomach is intensely inflamed.

All this indicates that the level of 8oz. could well be cut down to 4oz. or possibly 2oz. per 20lb. of carrot. The present level of 8oz. provides 24 lethal rabbit doses per ounce of carrot bait, so it is obvious that there is a good margin for reducing it. Naturally a reduction in level would depend on feed conditions at the time and on how well pre-feeds were taken. This reduction could be recommended only with the impalpable type of powder mentioned and should be done gradually, say first to 6oz., then 4oz., and perhaps ultimately to 2oz. if good kills were still being obtained.

Such a reduction from 8oz. to 2oz. would increase the amount of carrot necessary to poison a 100lb. sheep from 1.6oz. to 6.4oz. If this could be achieved, the danger to stock would naturally fall.

Arsenic in Glycerine

A few years ago a soluble arsenic poison which is acceptable to the rabbit was devised at Wallaceville. This is a simple solution of white arsenic in glycerine. This solution is readily incorporated in jam by mixing and it does not make the jam very fluid. Small-scale experiments showed that the bait was taken readily by rabbits. It kills quicker than the powder; 30 hours at the lowest level that kills. At higher levels (4 times the lethal dose) it kills in 3 to 4 hours. This material has not been really tried in pollard pellets.

In jam it would suffer from the same disadvantages in danger to stock as phosphorus in jam or 1080 in jam and would have to be turned in. In pellets it would remain potent until the pellets weathered away.

Strychnine

There is no place for strychnine in rabbit poisoning in a "killer" policy. One often hears that 20,000 rabbits were taken off a property with strychnine in a certain year, but little is said about the 30,000 that were left.

1080 (Sodium Fluoroacetate)

Sodium fluoroacetate (1080) was isolated by Marais of the Onderstepoort Laboratory as the toxic principle of a poisonous plant gifblaar (*Dichapetalum cymosum*) in 1944. Since then it has been synthesised and used successfully as a rat poison in the U.S.A. and as a rabbit poison in Tasmania and other Australian states.

In 1948 the Animal Research Division was aware of its possibilities as a rabbit poison, but was reluctant to advocate its use in New Zealand owing to there being no known antidote. It has been used with great success in Tasmania, but arsenic has never been used there and its capabilities are not known. There are no rabbit boards in Tasmania and all handling of the poison and poisoned baits is done by officers of the Department of Agriculture. The standard practice in Tasmania is for all uneaten baits to be buried on completion of a poisoning operation. This would be impossible with aerial distribution.

Trials are being carried out in this country at present to decide whether or not 1080 should be put into general use. It is certainly a good poison in some areas, but has given some good and some poor kills. Whether or not the poor kills were due to some defect in technique is not yet known, but 1080 obviously has certain possibilities and can already be regarded as a further potential weapon in rabbit destruction in New Zealand.

Sheep are a little more susceptible to poisoning by 1080 than are rabbits, and dogs are about six times as susceptible as rabbits. The danger to dogs through eating rabbit carcasses is high and many dogs were lost in Tasmania when the poison was first used there.

Though 1080 is very soluble in water, it is not yet known how much rain is required to leach the poison out of carrot or other baits. This will be investigated. Decomposition of the baiting material may well be required before 1080-poisoned areas are safe for restocking. In one trial in New Zealand, during which there was heavy rain, four-fifths of the poison was leached from carrots in 10 days.

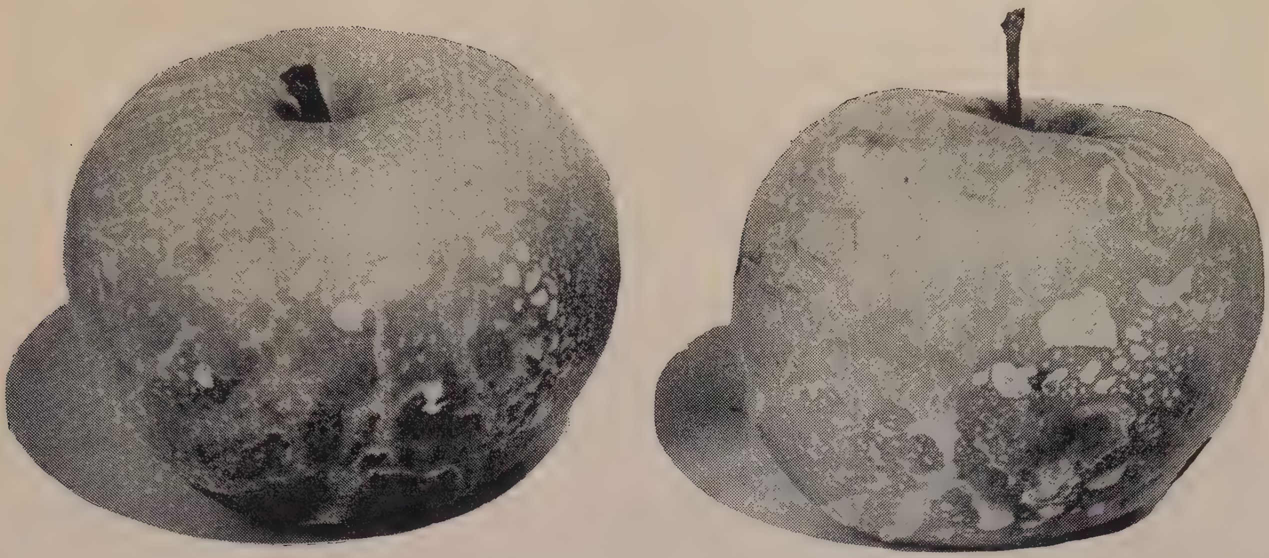
Danger to Stock of Various Poisons

Phosphorus is the only rabbit poison that becomes safe through lapse of time after poison is laid. This can be made certain only by correct mixing methods and especially by use of coarse pollard.

Arsenic never becomes safe and stock must be left off poisoned areas until bait material is decomposed. Improvement may be achieved by reducing the levels of poison now used.

For 1080 it is not clear whether leaching will reduce poisonous properties. Any use of this material will have to take particular regard to possible danger to stock.

Safeguards with Poisonous Sprays



Protection of the Crop, Producer, and Consumer

By F. HURST,
Chemist, Dominion Laboratory, Department of Scientific and Industrial Research, Wellington

THE increasing use of new chemicals for the protection and production of fruit and vegetable crops has caused concern lest the consumer of the produce should receive amounts of spray residues injurious to health. When new materials for crop protection are tested it is therefore as necessary to determine the extent of the hazard they would present to users and to consumers as it is to investigate their usefulness for plant protection. This screening process has resulted in the rejection of some chemicals which would be too toxic for use on food crops, but a careful appraisal of many factors must be made before a spray material may be deemed safe for use. This work is carried out in New Zealand by the Plant Diseases Division of the Department of Scientific and Industrial Research, which operates the voluntary certification scheme for chemical therapeutants, and by the Dominion Laboratory, Department of Scientific and Industrial Research, which makes the chemical analyses and measures the spray residues on the crops.

THE first systematic investigation of spray materials was begun more than 20 years ago with a survey of lime sulphurs available in New Zealand. As a result of the large number of low-quality sprays found, standards were set and the voluntary certification scheme was started.

When new therapeutants are introduced into New Zealand samples of them as they will be marketed may be submitted for certification. These undergo biological tests in the laboratory and extensive field trials. In addition, chemical and physical analyses are made to measure the various ingredients.

This analytical work has become more complex as new chemicals have been introduced, and the Dominion Laboratory has had to develop new methods for them. For example, both DDT and BHC (benzene hexachloride) occur in several forms which are very similar chemically but differ very much in their action on insects. However, the amounts of the active forms in these can now be measured with an infra-red spectrophotometer. Again, the size of particles in fungicides has a big influence on the protection the fungicides give against disease, so the sizes of the particles in sprays have to be measured. The largest particles dealt with just pass through the finest sieve, and the smallest particles have a diameter only one-hundredth of that of the largest particles. Different-sized particles have been separated out and used in trials so that the effects of size can be studied.

Where the amount of residue of spray materials on harvested fruit or vegetables has to be found, methods which will measure as little as 1 part of the residual chemical in 10 million or even 100 million parts of the original fruit or vegetables may be required. The first measurements of residues were of lead arsenate on apples 30 years ago.

Toxicity of Materials

Despite the search for safer materials, all therapeutants that are toxic to insects, bacteria, or fungous diseases are to some extent poisonous to humans. What are the hazards to the consumer as a result of the materials used in the production of fruit and vegetables? Many factors must be taken into account before an answer can be given and a programme of spraying recommended that will ensure that any residue on harvested crops is harmless.

Insecticides may be divided into three groups: Non-persistent, persistent, and systemic. Examples of the non-persistent insecticides are HETP (hexaethyl tetraphosphate) and TEPP (tetraethyl pyrophosphate), which are highly toxic to insects and to humans, but are readily broken down by water to harmless products. Their instability allows them to be used close to the time of harvest, as deposits rapidly

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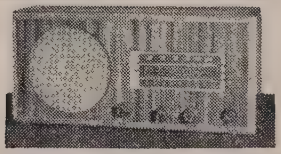

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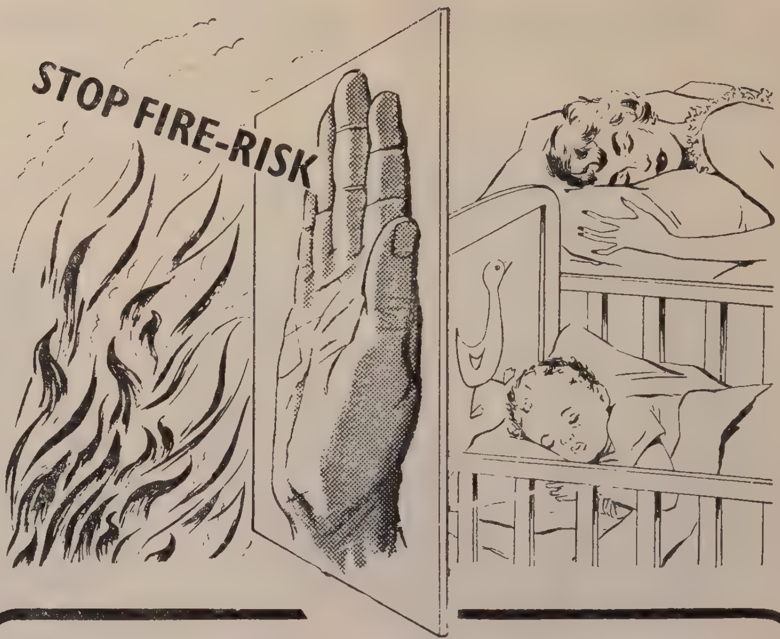
Building and Use of Cattle Yards

Farmers contemplating the building of cattle yards or the replacement of unsatisfactory or failing ones can obtain many ideas from a bulletin just issued by the Department of Agriculture, Bulletin No. 380, "Cattle Yards". It is available free from all offices of the Department.

Information in the bulletin represents the collected experience of many farmers, and the designs of yards, gates, bails, and other details are all those which have been well tried. Particular stress is laid on how good yards can be made at a reasonable cost through the avoidance where practicable of expensive post and rail construction. There are over 50 illustrations of various features of yard design and diagrams of layouts are included.



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disappear, leaving no hazardous residue. Volatile insecticides such as BHC and nicotine sulphate soon lose their toxicity in the field, and parathion volatilises fast enough to leave no hazardous residue if applications cease a month before harvest.

Persistent insecticides are valuable for their prolonged insecticidal action, but they leave a residue which may be a hazard to beneficial insects and to the consumer of the produce. Typical of them are the inorganic arsenates, which are extremely toxic to honey bees, and organic DDT, which destroys parasites and predator population to such an extent that spider mite infestations follow its regular use.

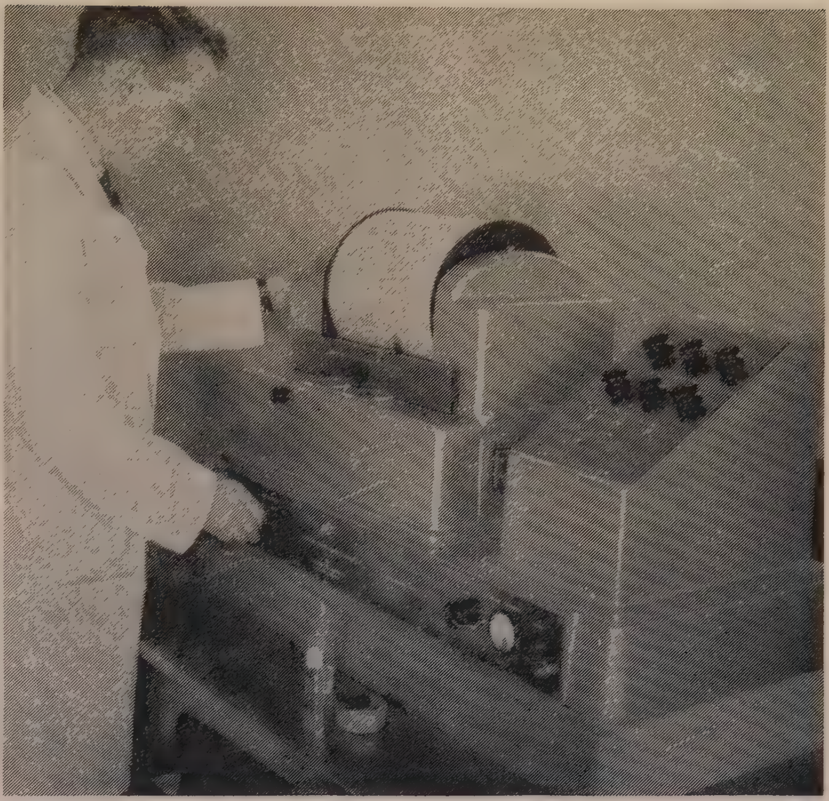
Systemic insecticides are absorbed into the plant and then move in the sap of the plant. Generally they are moderately persistent, so that the risk from poisonous residues must be controlled by allowing an interval between spraying and harvest. Caution must be observed in the use of schradan, as it is converted into a more toxic compound by the plant; in New Zealand it is recommended for use only on ornamental shrubs.

Acute and Chronic Toxicity

The toxicologist determines the toxicity of materials by experiment. He must measure both the acute toxicity, or the size of a single lethal dose, and the chronic toxicity, or the size of a succession of small doses that will cause injury when fed over a long period. A substance may have a high acute toxicity, yet a low chronic toxicity, and vice versa. For instance, the beta isomer of BHC has a very low acute toxicity, yet rats feeding on a diet containing 10 parts per million of it suffer serious tissue damage. Conversely toxaphene, which has a high acute toxicity, may be fed to rats in a diet containing 100 parts per million without any symptoms appearing.

To assess the chronic-toxicity level, feeding experiments must be conducted for not less than 1 year, preferably for 2 years. The experiments must be conducted on different experimental animals, as different species have different degrees of susceptibility to various materials. Rats are more resistant than dogs to the ill effects of most insecticides, but dogs can tolerate greater amounts of DDT than can rats.

The necessity for tests to include more than one species before the hazard can be assessed was emphasised dramatically a few years ago. Several workers in a factory producing a new insecticide were stricken with paralysis which proved permanent, though in feeding experiments previously carried out on rats and rabbits the animals had shown no such symptoms. Immediately further work was started and showed that the same symptoms occurred in dogs and fowls as in humans.



An infra-red spectrophotometer. With it the amounts of the active forms in DDT and BHC can be measured.

As well as the experiments to measure the oral toxicity (the toxicity when the material is taken in through the mouth) of a material tests are conducted on its dermal toxicity (the toxicity of the material in contact with the skin). This is highly important for the protection of those applying poisonous materials. Nicotine sulphate and the organic phosphate group of insecticides are generally readily absorbed through the skin and are very toxic, but DDT and BHC are not easily absorbed and are much less toxic than when taken orally.

Risk of Accumulation

The next steps are to learn what happens to the poisonous substance in the body. Is it broken down into harmless products by the body processes? Is it passed through unchanged or is it stored in the bones, or the liver, or some other organs? Is it a cumulative poison? Lead is an example of a cumulative poison, as it accumulates in the bones and soft tissue. DDT on the other hand is stored in fat, particularly in the fat round the kidneys, and in milk.

Cows fed on forage sprayed with DDT will give DDT in the milk and continue to do so for a considerable time after forage with no DDT is substituted. If the milk contains say 2 parts per million of DDT, butter made from this milk will contain 30 to 50 parts per million of DDT. In view of this danger great attention has been focused on the possibility of harmful amounts of DDT being consumed, but no human ailments due to this cause have been found.

All these experiments must be carried out before a safe level for poisonous substances in the diet can be set. The presence of such a substance in foods which make up a large part of the diet must be regarded more seriously than its presence in commodities that comprise a smaller proportion of the diet. In New Zealand the legal limits of the amount of lead, arsenic, and DDT residues permitted on fruit and vegetables have been set.

Recently the authorities in the U.S.A. have set out tolerances for residues of pesticide chemicals covering the whole range of new chemicals now in use. Each chemical is listed with the crops on which it may be used and the amount of residue which will be permitted. No residue of certain chemicals is permitted on fruit or vegetables as prepared for market.

▲ Measuring mercury residues on apples.

▲ Measuring BHC residues on apples.

These chemicals are DNOC, HETP, TEPP, hydrocyanic acid, mercury-containing compounds, and selenium compounds.

Limits for pesticides in food under U.S.A. standards are:—

	Parts per million
Aldrin	0.1
BHC (mixed isomers)	5
Lindane (gamma isomer)	10
Captan	20
Chlordane	0.3
DDT	7
DDD	7
Dieldrin	0.1
Ferbam	7
Lead arsenate (arsenic trioxide)	3.5
Nicotine	2
Parathion	1
Toxaphene	7
Zineb	7
Ziram	7

New Zealand's limits for DDT are the same as in the U.S.A., but are lower for arsenate residues (1.5 parts per million against 3.5 parts).

Reduction of Residues

Though spray materials are subject to weathering and other losses in the field, many persist on the crop for long periods. The proportion of residue present will decrease as the fruit or vegetable grows, and the amount is lessened by the mechanical effects of rain and wind and chemical effects such as oxidation and hydrolysis.

By studying the residues under varying conditions with different programmes of spraying it is possible to measure the rate of reduction of residue and recommend suitable spray programmes. For example, lead arsenate sprays applied to fruit late in the season were found to cause residues at harvest containing more arsenic than was legally permitted. However, if the last lead arsenate sprays were applied before the end of December, the residues were below the legal maximum.

Figures for the residues of some insecticides found on apples at harvest under New Zealand conditions are as follows:—

	Residue in parts per million	Sprays applied
DDT	1.3-6.7	Throughout season
DDT	0.3-4.5	Before mid-January
DDD	0.4-0.8	Throughout season
Toxaphene	1.5-5.0	Throughout season
Parathion	0.03-0.05	Throughout season
Lead arsenate (as arsenic trioxide)	1.2-2.6	Throughout season
Lead arsenate (as arsenic trioxide)	0.3-1.5	Before end December
BHC	0.01-0.2	1 to 5 sprays
Selenium compound	0.01-0.06	Spring only
Schradan	0.6-0.9	November & January

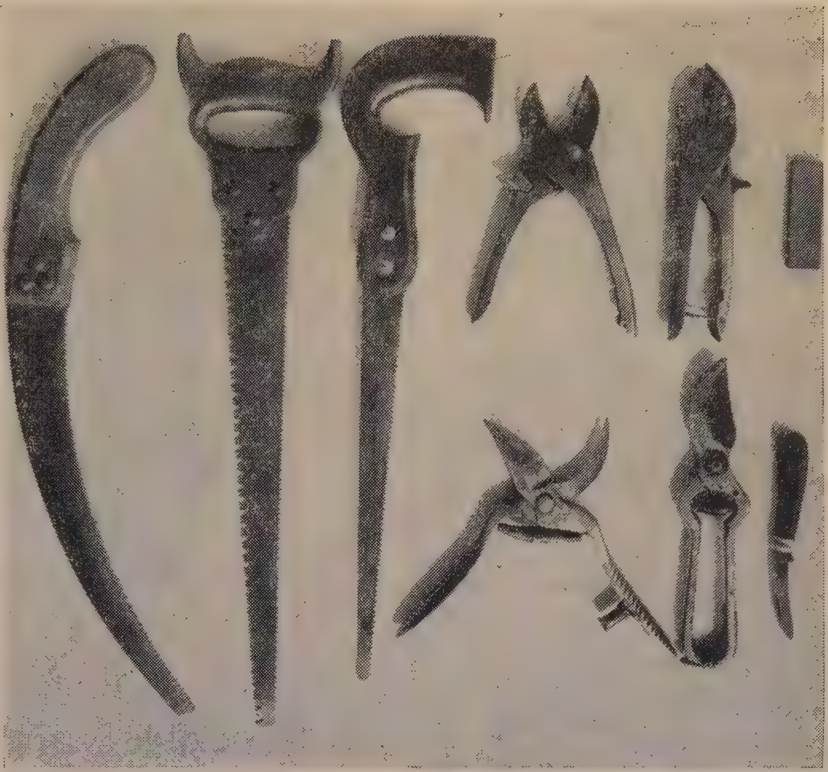
Much work has been done in studying the residues on crops so that pesticides with potentially poisonous characteristics may still be used safely. New chemicals are being tested continually, with great emphasis on reduced toxicity. Malathion, one of the newest insecticides, belongs to the organic phosphate group, yet is comparatively safe to use because of its low toxicity. Further improvements, both in extending the effectiveness of sprays and in reducing their hazards, can be expected.

Trials with antibiotic sprays like streptomycin have shown success against such intractable diseases as fireblight, though the cost is high. The development in some pests of resistance to insecticides makes continued research necessary so that alternative methods of control may become available.

However, the user of pesticides on food should never lose sight of the basic reason for their use. It is not the control of insects but the production of more and better food and the value of any food is lowered if it contains residues of poisonous materials. Therefore the recommendations for the use of any pesticide must be based not only on the control achieved by its use, but on the quantity of the material remaining on the crop at harvest time and the possible effect of the residue on consumers.

The Home Orchard in Winter

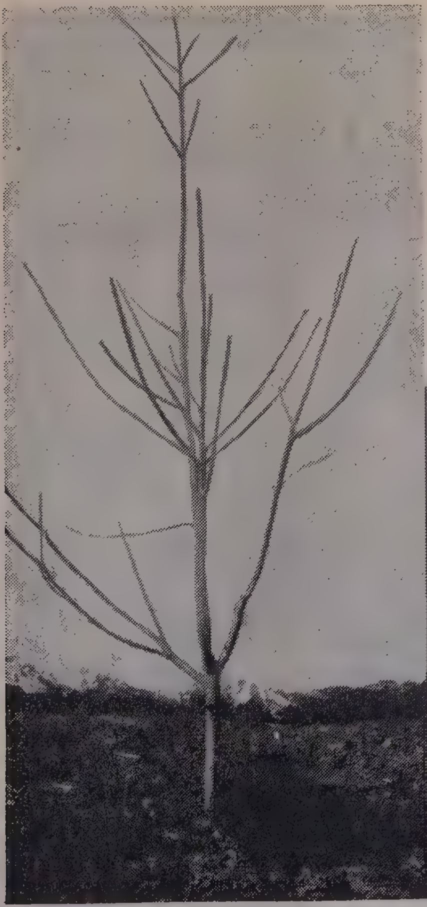
THE winter activities of the home orchardist are the most interesting of the year, apart from the harvesting of crops. As well as routine spraying and pruning any new trees should be planted when conditions are suitable. New plantings may consist of new varieties, to fill a gap in the supply of fruit during the harvest period, or young trees to replace any which have been removed. In this article spraying and pruning are discussed by S. P. Money, Horticultural Instructor, Department of Agriculture, Wellington.

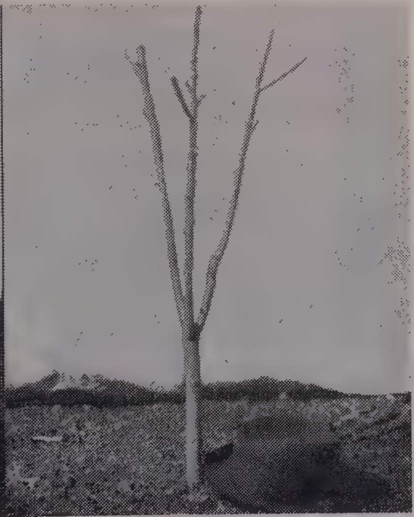


▲ Tools used for pruning. Pruning saws can be straight or curved and secateurs can be scissors type (bottom) or anvil type (top). Green and Hahn photo.

← A well-shaped tree as received from the nursery.

▼ The same tree pruned back to two or three well-balanced shoots. The upright shape will give strength to the main leaders. Sparrow photographs.





SPRAYING

WINTER spraying in the orchard has as its main purpose the destruction of overwintering stages of insect pests and fungous diseases. If left unchecked, these troubles will start to build up early in spring and could cause considerable damage to crops and trees.

Winter Oil

Overwintering scale insects, many other pests, and eggs of red spider mite are destroyed by the application of winter (red) oil. This spray is a red, emulsifiable oil which when mixed with water and applied over the whole tree leaves a film of oil which lasts for 3 weeks or more, thus excluding air from the red mite eggs and scale insects. It is because of this smothering effect that care must be taken to ensure that the tree is fully dormant when the spray is applied.

Lime Sulphur

Lime sulphur is another common winter spray. It has the dual role of fungicide and insecticide, but its most important function is the elimination of fungous infections. With this spray, as with red oil, complete dormancy of the trees is important if damage is to be avoided when it is used at winter strength. Weak strengths of lime sulphur are used for summer sprays on growing trees, but winter-strength

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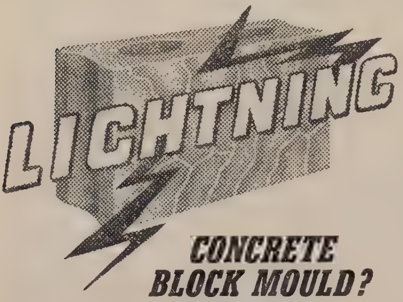

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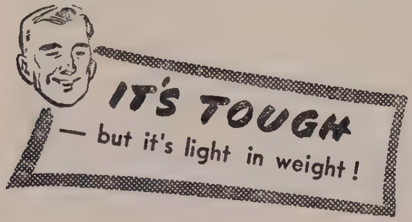

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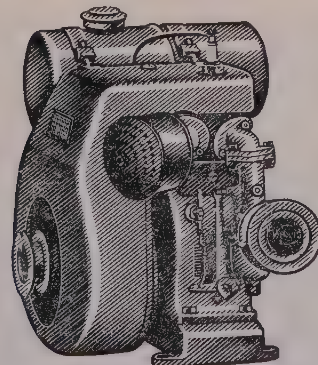

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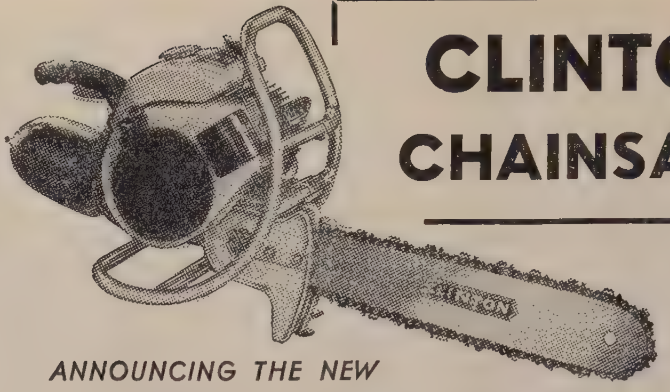

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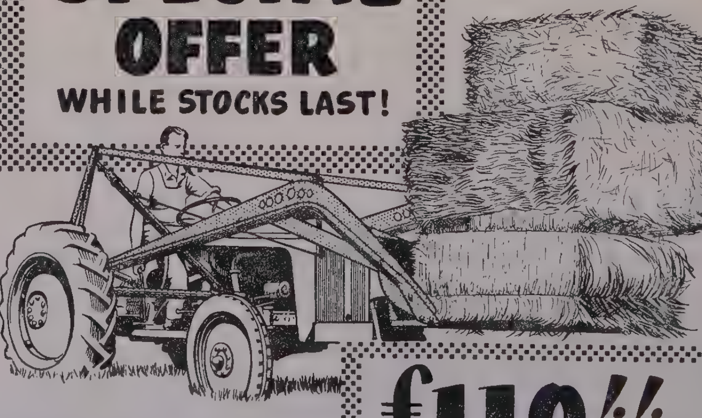

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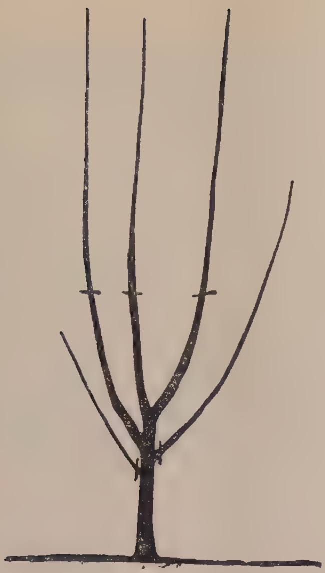
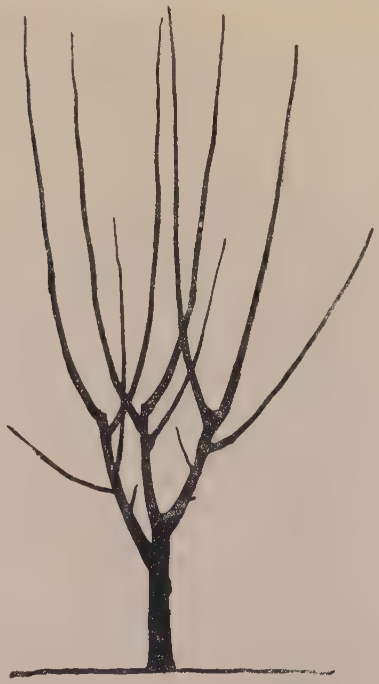
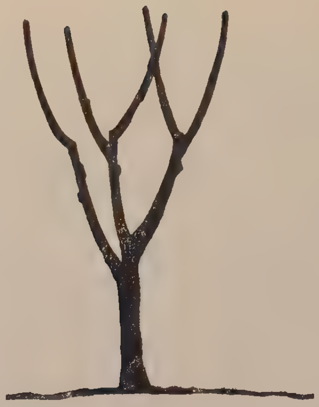


A young tree at the time of planting, with the suggested positions of pruning cuts marked.



A young tree before being pruned at its second winter.



A young tree after being pruned at its second winter.

sprays can be applied safely only when trees are completely dormant. Overwintering spores of brown rot fungous (*Sclerotinia fructicola*) are killed by this spray. A complete spray programme with recommended strengths was published in the home orchard notes of the August 1955 issue of the "Journal of Agriculture".

PRUNING

Pruning is the art of modifying the natural habit of the fruit tree to improve its commercial value as a cropping unit by securing more regular and prolific crops of good-quality fruit. The main objects of the pruner may be stated as:—

1. Treatment of the young tree to build up a vigorous, mechanically strong framework capable of carrying heavy crops over a long period without damage.

2. To train the tree to a form which allows ease and economy of management, disease control, and harvesting.

3. To provide for an even distribution of healthy fruiting wood throughout the tree during its fruiting life.

4. To remove dead, dying, and diseased wood.

5. To maintain size and quality of the fruit.

To become an efficient pruner it is necessary to understand the parts of a tree and their functions, as well as the way the various kinds of fruit trees produce their crops. These are described in the two types of pruning (shaping and maintenance pruning) below.

[*Sparrow*

Unpruned laterals showing fruit bud development from the base. From left—Gravenstein, Sturmer, and Jonathan.

Shaping Pruning

A tree from the nursery is comprised of a rooted stock on to which the variety of fruit is budded or grafted. At the point of union of these two parts a swelling or the cut end of the stock is usually visible. Trees sold in winter after budding are single rods with no branches. Older trees are generally branched. When rods are pruned the scion should be cut so that the top buds are 18in. to 21in. from the ground.

If the nursery stock is much branched, as it generally is, it should be reduced to two or three well-balanced shoots. Care should be taken, however, to see that those selected are not too close to the ground or diverging at too wide an angle from the main stem. Branches left in these positions would not only spoil the shape of the tree but could be too weak to carry heavy crops. From this point on it is simply a matter of selecting suitably strong shoots each year as leaders to build the main framework of the tree as shown in the diagrams on this page. This multiplication of leaders should continue until there are seven or eight. A greater number would result in weaker branches likely to break while carrying crops.

If the tree has made good growth, a start may be made at the third winter pruning to form the fruiting arms. When the strongest and best-placed shoots have been selected as leaders all other competing shoots should be cut right back and only a few of the lighter twigs on the older wood left as laterals.

To secure a well-placed fruiting arm a bud on the outside of each leading shoot is selected about half way up the shoot, say 3ft. from the ground. The leading shoot is then pruned back to the first bud above this point on

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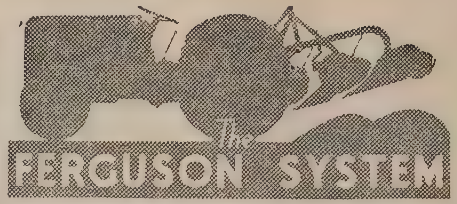

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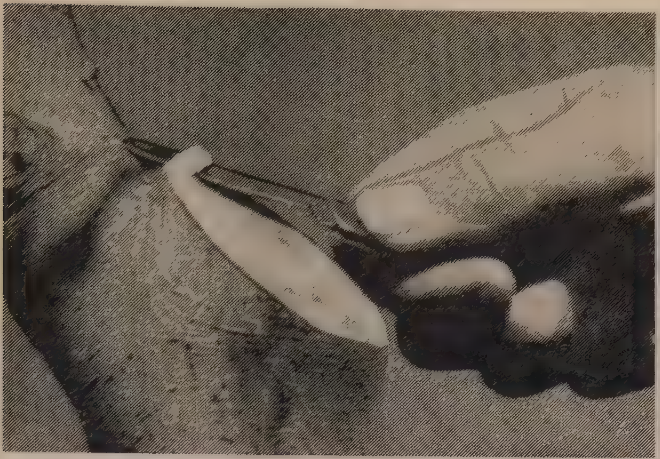
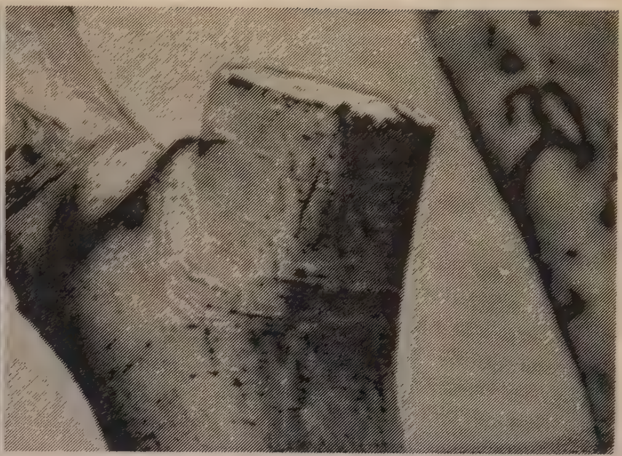


[Sparrow

▲ A branch should be removed by cutting it off close to the main branch. The edges remaining should be trimmed with a sharp knife.



[Sparrow

▲ This cut was made too far from the main branch, leaving an ugly stub which will not heal over readily.

the inside of the shoots. The effect of this pruning should be to give a strong, erect leading shoot from the top inside bud and a slightly weaker fruiting arm shoot growing at an angle from the selected bud on the outside of the leader.

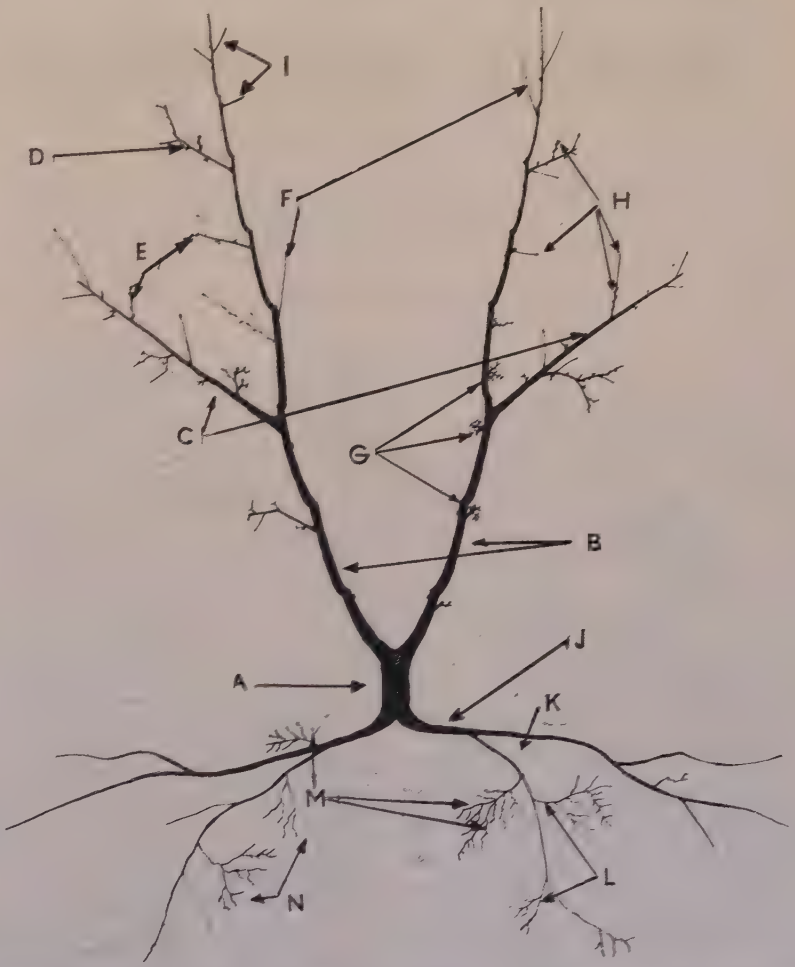
In districts where very strong growth is made by peaches, nectarines, and plums the framework may be built rapidly by leaving the annual extension of growth of the leaders unshortened for 3 or 4 years, but most light laterals should be cut back to stubs for the first year.

Apricot and cherry trees seldom produce as much annual growth as peaches and plums and their framework should be built by annual pruning.

Maintenance Pruning

The parts of the bearing tree are defined in the illustration at right.

The treatment of the bearing tree once the framework has been established is essentially one of replacement of temporary parts. This is because the fruiting wood becomes old and exhausted and provision must be made for it to be replaced by young, vigorous fruiting wood. It is also necessary to prevent overcrowding of new wood. New growth can be thinned out to prevent overcrowding, but the cutting or shortening of all annual wood shoots, as is often practised in home gardens, is likely to cause excessive growth. In those fruits where the crop is produced on spurs and second year wood greater and earlier fruit bud formation can be encouraged by leaving new lateral growths unshortened for the first year.



Definition of tree parts: A—Trunk. B—Leaders. C—Fruiting arms. D—Lateral. E—Fruit twigs. F—Wood shoots. G—Fruit spurs. H—Fruit buds. I—Leaf buds. J—Main root. K—Secondary root. L—Lateral roots. M—Fibrous roots. N—Hair roots.

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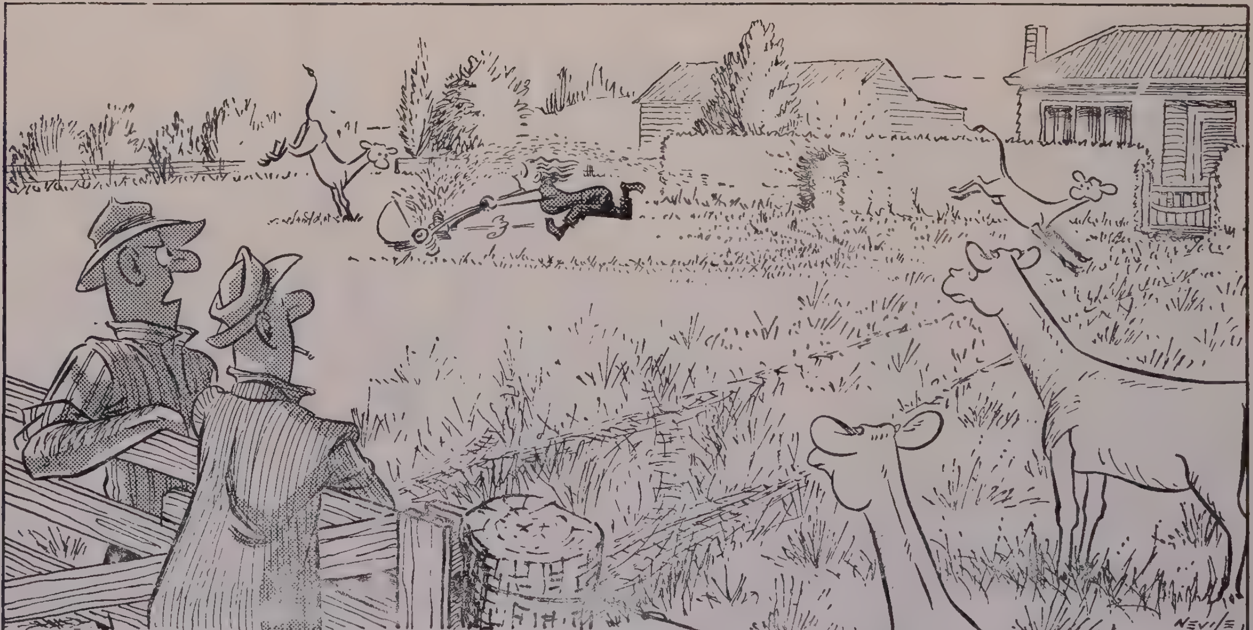
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Very strong lateral growths should be removed completely, as these may compete with the fruiting arms.

Pip Fruits

The fruiting buds of pip fruits are produced on second year's wood and from each fruiting bud in successive years fruit spurs are built up. These are small branching systems of fruit buds. A system of pruning which gives good results consists of the removal of the fruiting wood as it becomes exhausted and replacing it with short laterals. Laterals are encouraged in preference to spurs, as they are better conductors of plant food and are more easily renewed when they become aged.

Generally this pruning is accomplished by the gradual removal of older spurs and replacement by young laterals so that at no time is any fruiting wood older than 5 or 6 years.

To encourage early fruit bud development the lateral is left unshortened for the first year and shortened after fruit buds have formed, that is, in the second year.

For older trees which have been allowed to produce too many branches reconditioning can be achieved by thinning the branches, but great caution must be exercised when large cuts are made, as there is a danger of infection from fungi or bacteria. To overcome this danger a branch to be removed should be cut as close to the main branch as possible and the edges trimmed with a sharp knife. This encourages more rapid healing. The wound should then be sealed with a sealing compound such as heavy petroleum jelly, grafting mastic, or a heavy sealing paint such as red lead.

Plums, Apricots, Cherries

Plums, apricots, and cherries also begin to bear their crops on 2-year-old spurs, but refurnishing can be done as described for pip fruit over 3 or 4 years by eliminating 20 to 30 per cent. of old spurs and laterals each year.

Peaches and Nectarines

The fruiting habit of peaches and nectarines is different from that of pip fruit and other stone fruit. Fruit buds are borne only on lateral growth made the previous season. Laterals which have borne fruit will not produce another crop, and this determines the pruning method. Where the tree is making very vigorous growth triple buds, consisting of two fruit buds with a leaf bud between, will often occur. Single fruit buds only are borne where growth is poor.

The pruning of bearing trees is generally confined to removing spent wood which fruited the previous season and thinning the new lateral growth, attempting the whole time to keep the new growth as near to the main framework of the tree as possible.

Fairly heavy annual pruning is required to maintain vigour, the removal of half or more of the lateral growth being normal. Laterals required for fruit should be left uncut and those not required removed completely.

If the lateral growth is not thinned sufficiently, the type of tree results that is seen in many home gardens, with gaunt, bare lower limbs and all new growth crowded into the top of the tree. If this happens, the leaders should be cut back to force new growth farther down, the importance of sealing the wounds against infection by silver leaf and other fungous diseases being kept in mind.

Berry Fruits

Raspberries which were not pruned immediately after harvesting should be pruned now. Fruit is borne on canes which grew during the previous summer. All canes left after the previous year's pruning, that is, the canes which fruited last season, should now be removed and the new canes thinned out where they are too crowded together with weak or damaged canes.

Gooseberries: Buds on young laterals produce the best fruit and to maintain the production of good-quality fruit a refurnishing system as described for apples is advisable. To make picking easier all crossing and ingrowing laterals should be removed and plants with a weeping habit such as Farmer's Glory should be pruned to an inside bud to make them more erect.

Black and red currants: These two similar fruits have different fruiting habits which must be taken into account when they are pruned. Black currants produce fruit on growth made the previous season. The pruning of black currants is simply the removal of old wood and weak growth, leaving the strong new shoots arising from near the ground. Unless growth is encouraged from near the ground, the bushes develop with long, bare shoots with short fruiting wood at the top. Such bushes become crowded and produce poor crops. The bushes should be kept well spaced and open.

Red currants require different treatment, as they fruit on 2- and 3-year-old wood and on spurs from older branches. Unlike black currants, red currants are shaped to form a bush of 8 to 12 strong branches, with fruiting laterals and spurs which are renewed every 4 or 5 years.

Preparing for Grafting in Spring

Scions for grafting should be collected during the pruning season and be carefully labelled and layered in bundles in a cool, moist, shady place until grafting time in early spring.

OBITUARY

Mr. R. E. Binfield

THE death occurred on 22 March of Mr. R. E. Binfield, Horticultural Superintendent, Department of Agriculture, Christchurch, after a long illness.

Mr. Binfield joined the Horticulture Division at Auckland in 1928. He spent the greater part of 1928, 1929, and 1930 in the Cook Islands watching the grading and condition of citrus fruit exported. He took up duty as Fruit Inspector, Nelson, at the end of 1930 and then followed Mr. G. H. McIndoe as Orchard Instructor at Hastings in 1943. He remained there until 1944, when he was appointed Fruit Standardisation Officer at Wellington.

In 1947 Mr. Binfield became Horticultural Superintendent at Dunedin, transferring his headquarters to Christchurch in 1952.

Early in 1954 Mr. Binfield visited Australia on behalf of the New Zealand Apple and Pear Marketing Board to investigate the grading, marketing, and export of pip fruit.

Mr. Binfield was widely respected by growers and departmental staff for his extensive practical knowledge of fruit growing.

Mr. H. I. Forde

MR. HENRY IVE ("BARNEY") FORDE, who was killed in an accident in Hawke's Bay on 30 March, was well known in farming as a former editor of "The Journal of Agriculture" and agricultural correspondent of the "New Zealand Herald".

Mr. Forde came to the Department of Agriculture in 1937 after extensive experience in journalism. He served on the now defunct "New Zealand Times", the "Evening Post", and the London "Times". After studying economics in London he joined the staff of the late Mr. G. W. Forbes, then Prime Minister of New Zealand, and accompanied him to a Commonwealth Prime Ministers' conference. In the Second World War he was on the staff of the Government Censor.

Care of Livestock during June

Contributed by the Animal Research Division

WINTER FEEDING OF DAIRY COWS

EXPERIMENTS have shown that cows fed well during winter will produce from 26lb. to 63lb. more butterfat in the following lactation than those which have been poorly fed during winter. These results were obtained when both groups were well fed after calving. It is therefore very important to feed the cows well from now until calving so that they have ample body reserves to draw on during the first 2 months of the lactation. Building up these body reserves with even liberal amounts of hay and/or silage is difficult unless some grass is also available throughout the dry period.

With a portion of the farm closed up for autumn-saved pasture for feeding after calving it is particularly important to graze the rest of the farm under a controlled rotational grazing system with adequate spelling between grazings both to ensure continued grass growth during winter and to ration what grass is available throughout this period. Where subdivision is inadequate for this purpose break grazing with the electric fence is essential.

Since cows will eat grass in preference to most other feeds, they should be fed as much hay as they will clean up in addition to 20lb. of silage per cow per day.

LIVER FLUKE IN SHEEP

In areas where sheep become infested with liver fluke flocks should be drenched now. The only effective drug is carbon tetrachloride, which should be mixed with 4 times its volume of liquid paraffin. The dose of the mixture is 5 c.c. for sheep of all ages, and 1 gallon is enough for about 900 sheep. Further information about liver fluke in sheep and cattle will be found in Bulletin No. 248, which is available from the nearest office of the Department of Agriculture.

WORMS IN LAMBS AND CALVES

Worms are sometimes still troublesome in May and June, and if lambs or calves are not doing well, they should be drenched with phenothiazine at the full dosage rates recommended by the manufacturers. Further information about worms and drenching will be found in Bulletin No. 171, which is obtainable from the nearest office of the Department.

LICE ON POULTRY

Poultry lice can cause considerable loss of condition in birds and reduced egg laying. To control these parasites a fine trickle of 40 per cent. nicotine sulphate should be run along the perches on a calm night before the birds go to roost. Two or three treatments should be given at weekly intervals.

RICKETS IN LAMBS

Rickets in lambs occurs frequently during winter in Canterbury and other South Island districts. It is also occasionally seen in the North Island. Lambs wintered on green oats or barley are most susceptible, but other greenfeed or good pasture may also produce the condition. It can be prevented by giving one dose of 25 mg. of calciferol (a vitamin D concentrate) at the beginning of winter. This preparation can be purchased dissolved in olive oil, and full instructions for its use are supplied with it.

Even where rickets does not occur, this treatment may induce better growth in lambs during winter. It is unlikely to be beneficial during autumn, and the best time to administer it is about the end of May.

PIG PRODUCTION

Sows and store pigs should be fed on roots, grass, and up to 1lb. of meat meal or other high protein feed daily. Grazing pigs should not be confined to small paddocks during winter. The use of large grazing areas will reduce pasture damage considerably. Warm accommodation is essential for winter store pigs to avoid losses and to maintain steady growth. Early farrowing sows should be put in their farrowing quarters and fed 3lb. to 4lb. of meal daily.

After farrowing they should be fed 4 gallons of milk plus 2/3 gallon for each piglet suckled. Where insufficient milk is available meal should be used to replace the milk in the ratio of 1lb. of meal to 1 gallon of milk.

Constipation, which is common in late pregnancy, can be avoided by feeding ½lb. of bran daily or 4oz. of molasses 2 or 3 times during the last 10 days before farrowing.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during March and for the 8 months ended 31 March 1956, with comparative figures for the same month and 8 months of 1954-55, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
March 1956	12,846	265	13,111	—
March 1955	11,484	297	11,781	—
Increase or decrease ..	+1,362	—32	+1,330	+11.289
8 months ended 31/3/56	148,228	2,569	150,797	—
8 months ended 31/3/55	137,676	2,671	140,347	—
Increase or decrease ..	+10,552	—102	+10,450	+7.446

Butter in store at 31 March 1956 was 31,182 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
March 1956	7,060	1,639	8,699	—
March 1955	6,445	2,254	8,699	—
Increase or decrease ..	+615	—615	—	—
8 months ended 31/3/56	66,837	11,821	78,658	—
8 months ended 31/3/55	68,523	18,040	86,563	—
Increase or decrease ..	—1,686	—6,219	—7,905	—9.132

Cheese in store at 31 March 1956 was 25,928 tons

If these figures are converted into butterfat equivalent, there is an increase of 3.841 per cent. in butterfat graded for the 8 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

Winter Pasture and Crop Management

Seasonal Notes by the Extension Division

FIELDS on North Island dairy farms may be closed for winter-saved grass up to about the middle of June; for subsequent feed fields may be closed from then on after concentrated grazing of dry stock which have been heavily fed with hay and silage. Application of nitrogenous fertilisers in July on these later-closed fields may be worth while to increase early spring grass growth. The effect of close winter grazing and winter spelling on sward composition should be carefully watched, for harsh grazing subsequently encourages white clover growth and spelling encourages grasses, particularly Yorkshire fog. Adverse changes in sward composition should be avoided by not subjecting pastures to the same management each winter; fields which were winter spelled last year should normally be hard grazed this winter and vice versa. Wintering on the same fields year after year weakens the grasses and allows clovers to become dominant; they come away very quickly when spring growth starts, producing a flush of immature feed which is very liable to cause bloat.

YOUNG PASTURES

AUTUMN-SOWN pastures in their first year should be grazed closely to keep the vigorous winter growth of ryegrass in check and to allow clover to become established. In their second and third seasons young pastures are often clover dominant and spelling during late autumn and winter helps to thicken up the grass.

—A. C. BURGESS

* * *

HARVESTING POTATOES

EACH year many tons of potatoes are lost through dry rot after digging. This disease generally has its beginning where potatoes have been injured during digging. If the potatoes were not injured, this disease would not be able to gain access to the tissue of the tuber and thus the loss would be avoided. This is easily seen when a sack of potatoes is tipped out, when only those tubers that have been damaged are affected by dry rot. Those with the skin unharmed are generally sound. Damage is likely to occur in digging, pitting, and grading, but chiefly in digging.

DIGGERS

Most potatoes these days are dug by mechanical potato diggers. On these machines the main damage occurs on the aprons which convey the dirt and potatoes up from the ground. To free the potatoes from the dirt these aprons are agitated by sprocketed rollers. Most mechanical diggers have two aprons similarly agitated, and it is on the second one that much of the damage is done, as by this time the potatoes are often free from dirt and are being bumped over the bars with no protection. Consequently bruising is very common, though at this stage it is not very discernible to the eye. Often in a weedy crop a sack weighted with soil is placed so that it drags on the front apron, the potatoes, weeds, and soil passing beneath it on the apron. This helps free the potatoes from the weeds, but it also forces them down on to the bars of the apron and more bruising occurs. A further cause of damage is the digging of the crop before it is properly matured. Excessive skinning then takes place, thus predisposing the tubers to attack by the dry rot organism. When the soil is dry the apron agitators should be removed and replaced by plain rollers, and if the potatoes are free from dirt by the time they reach the top of the first apron, the second apron should be renewed.

WEEDS

Weeds germinating in autumn after the potato tops have died down often form such a mat with their roots on the rows that much agitating is required to free the tubers, resulting in excess bruising and consequent dry rot. A late mould before the weeds become too big gives some measure of weed control, and a method which is becoming increasingly popular is to spray the weeds with a desiccating weedkiller a few weeks before the potatoes are dug. This dries up the weeds so that less agitating is required to bring the potatoes out reasonably clean and with a minimum of damage.

—A. J. EBERT

* * *

AUTUMN CEREALS

AUTUMN and winter sowing of wheat is common in Canterbury, Marlborough, and North Otago. Land preparation should be early and thorough and should aim at conserving soil moisture for the crop. At drilling the soil should be rubbly on top and firm below. Cross 7 is still the most popular variety. Other varieties preferred in certain localities are Yielder, Hilgendorf, Fife Tuscan, Dreadnought, and Hunters. The usual seeding varies from 1¼ to 2 bushels per acre, the lower seeding rate being applied to lighter ground. Generally 1cwt. per acre of superphosphate or serpentine superphosphate is drilled with the seed. The majority of crops are grazed lightly in spring. Other autumn-sown cereals are oats and barley. Algerian oats are most commonly grown in Canterbury, as they are required for a dual purpose—greenfeed and later a grain crop. Russet is grown to some extent in South Canterbury. Autumn-sown barley is generally grown for greenfeed and the varieties used are Cape, Black Skinless, and Wong. Malting barleys are generally spring sown. The seeding for autumn-sown oats in Canterbury is about 2 bushels according to district, and that for feed barley will range from 1½ to 2½ bushels. The use of 1cwt. of superphosphate is recommended for barley, and 1cwt. to 1½cwt. for oats.

—A. STUART

* * *

WINTER FALLOW

WHETHER old pasture land intended for spring and summer sown root and green forage crops should be winter ploughed depends on local soil and climatic conditions. In the North Island spring ploughing is usual and satisfactory because the majority of soils where annual cropping is done are light and spring rainfall is adequate. Further, delaying ploughing until spring allows a further 3 or 4 months' grazing of the field, an important consideration in the winter feeding of sheep and cattle. In the lower-rainfall districts and on heavy soils winter fallowing for root and green forage crops is generally an advantage. Early ploughing allows the weathering of the soil and easier preparation of the seed-bed in spring and retention of moisture. Cultivation after ploughing should aim at quickly working the land down to a tilth without undue loss of moisture, and the furrow slices should be broken and the initial working of the seed-bed given before the advent of hot, dry conditions. The winter fallow of heavy land certainly helps to secure the desired fineness, firmness, and moisture content of a seed-bed for root and green forage crops.

—P. W. SMALLFIELD

Work in the Home Garden

THERE is very little to be gained in the less favourably situated gardens by sowing even the hardiest vegetables in June, but elsewhere, if drainage and soil conditions are good, broad beans, spinach, and even peas can be sown. The sowing of other hardy vegetables such as carrots, turnips, radishes, lettuces, and silver beet is usually better deferred until at least July; in some districts delay until August and even September may be advisable. In this article A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, discusses work in the vegetable garden in June.

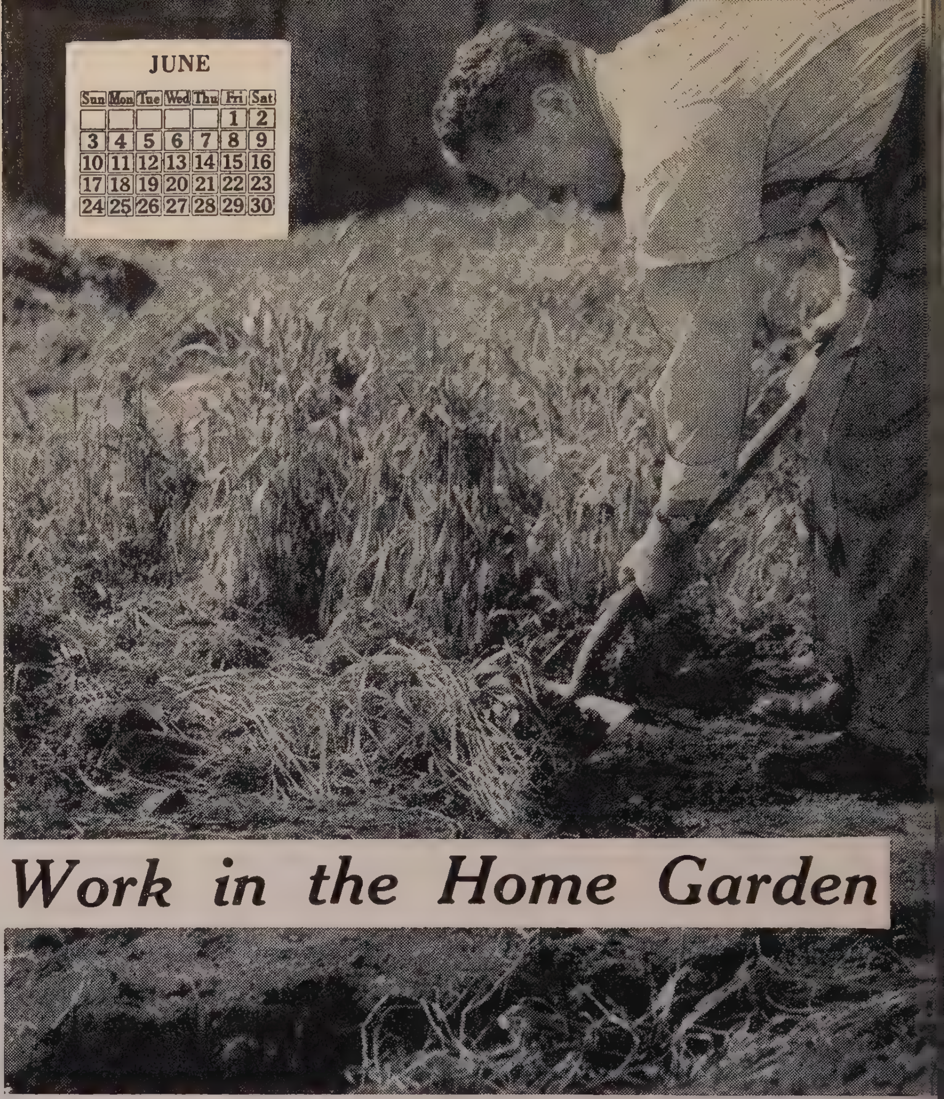
SPRING cabbage can still be set out in most gardens; also cauliflower in sheltered situations or in districts where winters are not too severe. Soils should be well drained and adequately enriched, preferably with organic material such as compost and farmyard or stable manure. Celery and leeks should receive their final earthing up if this work has not yet been done, and the digging of potatoes should be completed without delay. Broccoli or winter cauliflowers should be watched for signs of approaching maturity and the developing curds protected by bending or breaking a leaf or two over each head.

Land from which crops have been recently harvested and which is to be used within the next month or so should be dug over to improve drainage and to assist the rotting of root fibres and similar residues and to expose insect pests and their eggs to birds and other destructive agencies. Green crops that are in the flowering stage or approaching it or are growing on land soon to be used for a vegetable crop should be turned in to rot down. If digging is left for the future, the weather may make it more difficult.

Liming may be advisable and June and July are generally suitable months for applying lime, as in many gardens a considerable area is then bare of crops and winter and spring rains can usually be relied on to wash the lime down through the soil.

Asparagus fern growth should be cut down, if this has not been done, and the bed can be mulched with compost or a light dressing of farmyard manure. The compost heap can be turned or remade if required.

The well-planned home garden should show to advantage in June and though the kinds of vegetables available may vary from district to district, root crops should be available in variety as should some of the winter greens, such as winter cauliflower, savoy or winter cabbage, curly kale, and brussels sprouts. There should also be celery, silver beet, spinach, winter rhubarb, leeks, and lettuce, and, in store, potatoes, onions, pumpkins, squash, and sometimes kumaras and Jerusalem artichokes.



JUNE

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

[*Green and Hahn*

June is a good time to tidy the garden. Garden rubbish, weeds, and green crops can be dug in more easily if they are first skimmed off with a sharp spade a foot or so back from the line of digging and then put into the opened trench.

Garden Improvements

Winter, when the work of planting, sowing, and cultivating crops is greatly reduced, is usually a good time to attend to such jobs as the building of garden equipment or furniture or the improvement of garden amenities. Garden seats, bowers, trellises, and fences can be made or repaired. For those who do not already possess one, a frame or compost box will be found useful.

June is a good time, too, to repair or make paths or drains. Temporary paths laid across the soil can be forked up and the soil left so that it can be broken down by the weather, or permanent paths can be laid. Usually, paths made of hard-wearing material such as brick, stone, concrete, or even bitumen, are preferable to grass. Grass paths are readily damaged in winter, when growth is slow, conditions are wet, and traffic is relatively heavy; in summer grass dries out or needs frequent cutting to prevent seed developing and falling on the garden.

Wet areas that are now showing up should be drained by field pipes or by open material such as shingle and stones in the bottom of a trench. Effective drains can also be made by digging a trench and putting manuka scrub or similar material in the bottom or, if the texture of the soil is open enough, by putting in boards (in the form of a bottomless box) open side down. All such material should be deep enough not to interfere with deep digging or to cause the topsoil to dry out excessively in summer.

Broad Beans

Broad beans can still be sown in well-drained soil as advised in last month's "Journal". Broad beans are particularly hardy and are usually harvested when in most gardens vegetables are scarce and lacking in variety. The commonest varieties include the long-podded and the broad-podded or Windsor types.

Cabbages and Cauliflowers

Seed of cabbages and cauliflowers for successional planting can be sown now. Among the round, smooth-leafed type of cabbages, Golden Acre is excellent. In good conditions it is quick maturing and tender and in addition does not grow too large. Varieties of cauliflower such as Early London, Walcheren, and All Seasons are suitable for sowing now in most districts for planting out in early spring.

Except in a few specially favoured districts, seed should be sown in a sheltered, prepared bed with a favourable aspect or in a frame or cool, open glasshouse. Sowing in boxes is not recommended, but if the seed is sown in boxes, they should be deep enough to provide ample root room. Thinning may be advisable later.

The seed-bed for cabbages and cauliflowers should be deeply and thoroughly cultivated and the soil enriched with compost or other well-rotted material. Lime should be applied to most soils not recently dressed; 2oz. to 4oz. per square yard annually is usually satisfactory. Seed can be sown broadcast in beds, but for convenience of weeding and for ease of lifting is usually best sown in rows about 12in. apart. In heavy soil seed should be sown not more than ¼in. deep.

Cabbage plants of the pointed type for spring use can still be set out in most districts as advised in the March issue of the "Journal" (p. 217). In districts having a mild, rather warm winter, however, smooth-leafed round cabbage is often preferred, as it is considered that the hardier pointed types of cabbage tend to grow too rankly under such conditions. Cauliflower can also be set out where the situation is not too exposed and winter conditions are not too severe. Hardy varieties such as Walcheren and All Seasons should be chosen in the colder districts.

Horse Radish

The value of horse radish as a relish makes it worth growing where its flavour is appreciated and where space permits. Horse radish belongs to the same natural order (*Cruciferae*) as cabbage. The flavour of the root is very hot, and though it is used less now than formerly, it makes a welcome addition to a number of dishes if it is properly prepared. It is widely appreciated scraped and grated into fine particles and made into a sauce for roast beef and certain kinds of fish.

Horse radish is propagated by crowns or root cuttings, usually about 6in. long, though results are usually better if cuttings are longer; very good results are usually obtained from cuttings 12in. to 14in. long. They should be about the thickness of the little finger and not thinner than a lead pencil. After side shoots and rootlets have been removed cuttings should be planted in a prepared bed that has been deeply dug and well manured.

The easiest way to plant them is by making holes a little longer than the prepared cutting by pushing a stick into the soil so that holes are made about 1ft. apart and fairly near the horizontal. They should be long enough to accommodate the cuttings, but not more than 3in. to 5in. from the surface at the deepest part. The cuttings can then be inserted small end downward. There is no need to press the soil about them. Half a dozen roots are sufficient for the average family.

Roots can be planted in June, July, or August. In good soil they should grow to about 6in. to 8in. in circumference in about 6 to 8 months. Though horse radish is a perennial, it is best treated as an annual, because if it is left for several years, it usually tends to encroach on nearby crops. Plants grown for 2 years produce a larger yield, but the roots are usually woody.

Potatoes

June is rather early for most home gardeners to plant potatoes or to prepare them for planting, but in well-situated gardens in favourable localities, or even in some of the less favoured localities where the home gardener is prepared to keep all new growth earthed up until danger of frost is over, seed potatoes may be planted or selected and placed with the eyes up to sprout and green in a light, airy shed or outbuilding where temperatures are maintained well above freezing.

Where the tuber moth is troublesome the tubers, particularly the eyes or any scar or clearly marked depression should be dusted with 2 per cent. DDT dust.

← The well-run garden is a tidy garden and though most garden trash should be composted, some woody or diseased rubbish must be burnt. Sparrow photo.

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Sowing Early Crops

Except in favourably situated gardens where soil conditions are good sowing of peas, radishes, turnips, spring onions, spinach, silver beet, and lettuces should be deferred until at least the beginning of July unless a frame is available. Seed of lettuce for spring use can be sown in a box, but the other vegetables except peas should be sown directly into the frame, the soil of which should be light and well-drained, with well-rotted organic material such as compost thoroughly incorporated in it.

Heavy soils can be lightened by the addition of sand. This has no direct manurial value, but by improving drainage and preventing the soil from caking it increases aeration and so enables the soil to warm more quickly and young roots to penetrate more readily.

Rhubarb

Rhubarb should be grown in the garden of every home where its flavour is appreciated. Though the leaves contain poisonous substances, the stalks are a good source of vitamins and are a health-giving food. Six or eight plants should provide ample stalks for an average-sized family. Rhubarb is very easy to grow, as it is a strong, vigorous growing plant that stands setbacks fairly well. Only good strains should be grown, as there is a great difference in quality and yield between good strains and poor ones. Strains of rhubarb suited to early, main-crop, or winter production are available.

[Green and Hahn

Periodic dressings of lime are needed in gardens in most districts. Lime can be applied at any time, but if it is applied now, winter and spring rains should wash it deeply into the soil where it is needed.

[Green and Hahn

Horse radish is not often grown in home gardens in New Zealand, but it is easy to grow and many people would probably find it agreeable as a seasoning.

Though rhubarb is usually replanted about every 4 years, variety, soil, and situation all play a part, and in some instances beds continue to produce good stalks for 10 years or more.

Crowns can be lifted now or during July and laid aside to await the development of buds if division and replanting are deemed necessary. Even the ever-bearing or winter varieties are best lifted during the period of slow growth in late autumn or winter, though they are best replanted without delay after they have been split up. Dormant rhubarb crowns are very hardy and after lifting may be left in a cool, shaded spot until new buds begin to swell and can be distinguished readily.

Suitable sections each with one or at most two buds and preferably a piece of root can be replanted. Planting can be done now if desired, as dormant buds can usually be distinguished without difficulty if adhering soil and dead vegetable matter are removed.

When the crowns are replanted they should be covered with soil to a depth of about 1in. or 2in. and set out 24in. to 30in. apart in rows 30in. to 36in. apart according to the size and vigour of the variety. The soil should be rich in organic matter such as stable, farmyard, or poultry manure, compost, or well-rotted stack bottom. Where strong crowns have been planted in well-drained soil manuring is unlikely to be excessive in most home gardens, as rhubarb is a rank-growing plant and responds especially well to a rich soil. If natural organic manure is not available, artificial fertiliser such as blood and bone or a complete mineral fertiliser, mixed into the soil in the root area, usually gives good results in soils that are otherwise in fairly good condition.

Good drainage is very important. The site of a new rhubarb bed should be trenched or deeply dug and perennial weeds such as oxalis, couch grass, or convolvulus removed. The

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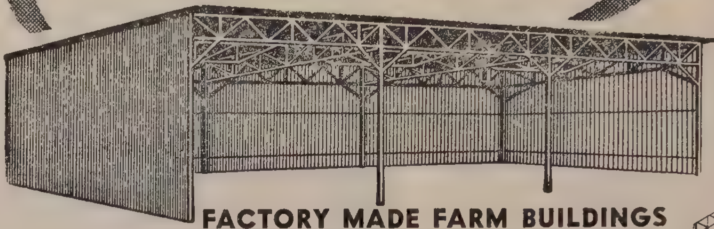

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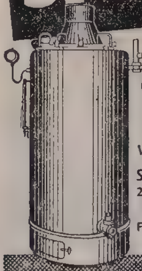

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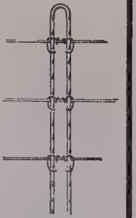

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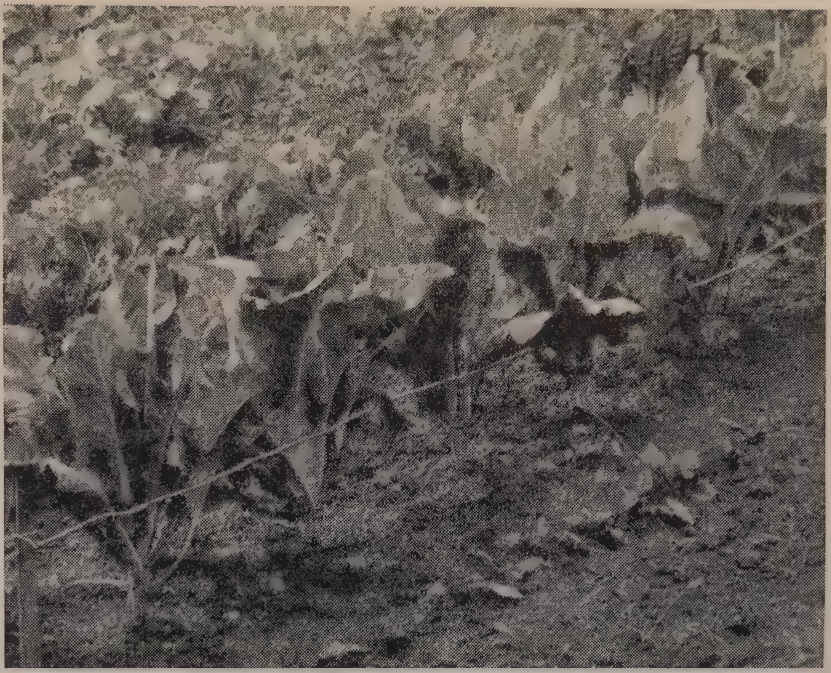

In gardens that are exposed to strong winds plants such as cabbage and brussels sprouts and the taller varieties of broccoli or winter cauliflower can be supported by strong string as shown.

bed should not be overshadowed by trees.

Standing Crops

Spring and savoy cabbages and cauliflowers should be kept weed free and the soil between the rows as loose and free as the spacing of the plants allows. In districts where humidity is high mildew is often troublesome and young cabbage plants should be sprayed with bordeaux or a suitable Government-certified substitute.

Unless the soil is rich spring cabbages and cauliflowers will benefit, as soon as temperatures become high enough for good growth, from a weekly application of organic liquid manure or of nitrate of soda or sulphate of ammonia at about 1oz. to 2 gallons of water. Both cabbage and cauliflower should be kept growing vigorously without check; poor soil produces poor cabbage and, combined with other adverse conditions such as low temperatures or root damage, may cause cauliflowers to button or form only miniature heads.

Where row spacing permits, soil can be banked along the row against the stems of brussels sprouts or late-maturing broccoli to help stabilise them.

Autumn-sown onion seedlings should be kept weed free, as they suffer even more than most crops from competition with weeds. Poorly developed plants usually benefit if given liquid manure.

Tomatoes

Any remaining outside tomato plants can now be pulled up and can usually be put on the compost heap. They should be chopped up first. However, where stem-borer caterpillars have been troublesome and the chrysalises of the looper caterpillar are present the stems are best burnt. If suitable material is available for making the compost heap into a very efficient one where the heat rises rapidly and remains for a time at a high enough temperature to kill the pests, the plants can be composted.

Nearly mature tomatoes that are not yet coloured should be stored as advised in the March "Journal".

Slugs and Snails

The dampness of the ground usual in late autumn and winter suits creatures such as slugs and snails, which can be very damaging to cabbages, cauliflowers, lettuces, and seedlings. There are several species of slugs and snails, though slugs are more common than snails and are present in practically all home gardens.

Slugs and snails feed at night or early in the morning. Moisture is necessary for them and they shun sunlight and dry air. They shelter during the day in any place that is cool, dark, and moist. Their habit of excreting a slime which assists them in crawling and also enables them to get rid of any irritating substance with which they may come in contact and their nocturnal habits make them very difficult to control.

Species differ somewhat in their eating habits. Some feed mainly on stems and leaves well above the ground and others feed chiefly at ground level or tunnel into the bases of plants, roots, or tubers well below ground level. They are voracious and have biting mouth parts with which they eat holes in plant tissue or eat the edges of it. The eggs of most species are easily recognised, being rounded, jelly like, and translucent.

Control

Slugs and snails can be controlled in a number of ways. Clean cultivation is the first step. When only a few plants or small areas are affected the number of slugs or snails can be greatly reduced if the gardener goes out at night with a torch and scissors and snips all those seen. Alternatively boards, tiles, cabbage leaves, or cut potatoes can be laid out and examined at intervals, the slugs and snails found under them being killed with hot water.

The most effective substance against slugs and a very effective one for snails is metaldehyde. It can be made up by mixing 1oz. of metaldehyde with 3lb. of bran. The mixture may be used dry or slightly damp, but not so damp that the flakes stick together. The metaldehyde must be finely ground and thoroughly mixed. Other feeding stuffs or even tea leaves may be substituted if bran cannot be obtained.

Baits can be broadcast thinly or scattered in very small heaps about 12in. apart. If the heaps are covered with material such as pieces of wood, the bait will be protected from birds and will remain effective for several weeks. Sticks of metaldehyde should be kept out of the reach of children, because it is injurious to health. Bait should be set out on a mild evening when the soil is moist; dry or frosty conditions are unsuitable.

Other controls include the dusting over the ground in the evening of burnt or hydrated lime, or, better, a mixture of 1 part of dehydrated copper sulphate (bluestone) and 9 parts of hydrated lime, both by weight. To dehydrate bluestone it should first be ground to a powder. Then the required amount should be heated in a tin until the material becomes a powder that is almost white.

A simpler but somewhat less effective measure is to powder bluestone and mix with it an equal weight of hydrated lime; this mixture should be broadcast at 1lb. per 10 sq. yds.

In the control of slugs and snails it is important to destroy the hiding places of the pests, such as heaps of rubbish, long grass, and weeds.

Establishment and Maintenance of High-producing Pastures in Otago and Southland

NEW ZEALAND'S economy and welfare depend primarily on exports of agricultural produce derived mainly from pasture converted by animals into wool, meat, or dairy produce. In this article N. A. Cullen, Research Officer, Department of Agriculture's Invermay Research Station, covers the main points in regard to pasture establishment, maintenance, and management. Throughout the article reference is made to trials carried out at Invermay Research Station.

NEW ZEALAND is famed throughout the world for the excellence of its grasslands. Unfortunately many pastures fall well below the category of the high-producing ones and a marked increase in production could be achieved through a general improvement in the standard of the pastures.

Perhaps the importance of good pastures and pasture management in the farm programme is not fully realised, though in recent years, owing to the emphasis on fat lamb raising and small seed production, farmers are becoming more pasture conscious and are realising the value of high-producing pastures.

In the southern provinces the breaking up of old pasture for forage cropping is an integral part of the management, and usually the poorest pastures are chosen for this. However, with improved pastures it becomes necessary to plough a high-producing sward, and the built-up fertility can be exploited through a cash crop or through improved forage crop yields.

HEADING PHOTOGRAPH: Cattle are desirable for the control of roughage, but overwintering may be a problem. Here cattle are feeding on hay at Invermay Research Station. Some of the high-producing pastures can be seen in the background.

Even where forage cropping is not essential periodic renewal of pastures is good policy. Most old pasture swards become sodbound and weed infested, and consequently lower producing than a new pasture of high-producing strains of grasses and clovers.

PASTURE ESTABLISHMENT

Preparation and Cultivation

The majority of farmers realise the importance of a well-prepared seedbed. Where cropping has taken place for several years weeds are a problem and repeated working is required throughout spring to reduce the weeds. This spring cultivation period is also necessary to secure the consolidation essential for good grass establishment. Consolidation is best obtained by confining the use of the discs to the early spring cultivations and relying on heavy harrows and the roller for the later ones.

Though the roller is a useful aid in consolidation, levelling, and breaking lumps, its importance in effecting consolidation is sometimes over-emphasised, since only the surface inch or two is affected. The harrows, on the other hand, consolidate to a depth of several inches. Thus a paddock which has been disced and rolled may appear to be an ideal, firm and fine seed-bed, but it is often poorly consolidated and much poorer than one which has been repeatedly harrowed and is rough and rubbly on top, though well firmed underneath.

Where old pasture is ploughed for sowing to new grass directly, that is, without any cash or forage cropping, more harrowing than usual may be required, owing to the open, friable nature of lea soils. Good pastures can be established without any prior cropping, and this method has been used successfully at Invermay Research Station.

Methods of Sowing

Broadcasting

Broadcasting is a common method of sowing, the seed usually being broadcast through a grass-seed box on a roller or drill. The seed may also be mixed with the fertiliser and sown through a topdresser. Usual procedure is to broadcast on a rolled surface and then use a light brush, chain, or tine harrow to cover the seed. Broadcasting has the advantage of providing good ground cover and is usually reliable under moderate rainfall conditions.

Drilling

Under low-rainfall conditions and where dry spells frequently occur drilling is often favoured. With drilling the seed is well covered, being placed at a depth of 1in. to 2in. where moisture is present and where, as the seed is placed with the fertiliser, a better strike can be expected.

With 7in. drilling: The chief disadvantage of this method is the large amount of bare space between the drills liable to be invaded by weeds. The row effect in a drilled paddock is often noticeable for many years. Cross drilling is sometimes done, but as this method involves double sowing and some burial of the seed where rows cross, it is not recommended.

With 3½in. drilling: Trials at Invermay have shown 3½in. drills to be very effective. In these trials a Blackmore coulter attachment was used which splits the seed and fertiliser into two drills 3½in. apart. This method combines the advantages of drilling—good initial establishment and low seeding rates—with those of broadcasting—density and ground cover. The row effect is small and weed invasion a minor problem. With 7in. drilling the grasses often smother the clovers. This is less apparent with 3½in. drilling.

In one trial the production from 3½in. drilled plots sown at 19lb. per acre outyielded 7in. drilled plots sown at the same rate and broadcast plots sown at 35lb. per acre.

A good seed crop of Montgomery red clover growing on hill country at Invermay Research Station. The clover was sown at 4lb. per acre with 40lb. of short-rotation ryegrass.

Time of Sowing

The time of sowing depends largely on the weather and the general management programme. Where the rainfall is reliable spring sowing may be done, but in areas liable to summer drought autumn sowing is favoured. As a general rule sowing should not be too early in spring, owing to the likelihood of weed invasion, or too late in autumn, when frost damage is likely. In trials on the time of sowing clovers, carried out at Invermay over three seasons, germination and establishment were extremely poor, less than 10 per cent., in the March sowings. Though grass species survived in these plots, the high clover mortality indicated the risk associated with sowing later than February in the southern districts.

Rate of Sowing

The pasture mixture is usually broadcast at about 30lb. to 45lb. per acre, though rates of up to 60lb. are sometimes used. A seeding of 45lb. comprising 30lb. of perennial ryegrass, 6lb. of cocksfoot, 2lb. of crested dogstail, 4lb. of red clover, and 3lb. of white clover would give approximately 350 seeds to the square foot, or more than 2 to the square inch. Thus even at this rate the sward would be very thick if every seed grew. Using heavy seeding rates to compensate for lack of consolidation is a poor policy, though sometimes heavy rates give a good initial establishment and weed suppression. Later, however, competition usually develops within the sward, and clovers may be suppressed.

With drilling, seed rates can be reduced to 20lb. to 30lb. per acre, or even less where simple mixtures are sown. Higher rates are not advisable, since the vigorous grass species suppress the clovers. Where cocksfoot and timothy are sown with ryegrass it is advisable to reduce the amount of ryegrass to 10lb. to 15lb. per acre, as otherwise the cocksfoot and timothy are likely to be suppressed. Reducing seed rates through the use of the drill can result in a big saving in the costs of establishment of new pasture.

Seed Mixtures

It is not possible to recommend seed mixtures to suit all conditions, since different mixtures are required, depending on the soil, fertility, rainfall, topography, and purpose. Some typical mixtures are given in the tables which follow. Always where available Certified seed should be used—Permanent Pasture or Standard

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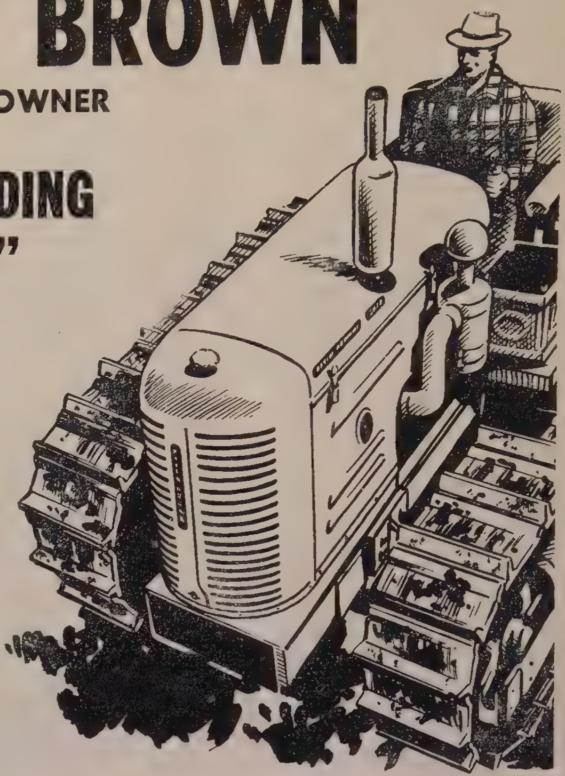

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where the pasture is for grazing only, and the higher grades—Government Stock, Pedigree, and Mother seed—where seed production is planned.

The general mixture given below is suitable for second-class soils of moderate fertility, subject to a rainfall of about 25in. to 40in., to be used for sheep and cattle grazing.

General Mixture for Second-class Soils

	Broadcast	Drilled
	lb.	lb.
Short-rotation ryegrass	5-10	3
Perennial ryegrass ..	15	10
Cocksfoot	5	3
Timothy	3	2
Cowgrass	2	1
Montgomery red clover	2	1
White clover	3	2
	35-40	22

If a cocksfoot dominant or subdominant sward is desired, the short-rotation ryegrass should be reduced or omitted and the cocksfoot increased to 10lb. to 12lb. per acre.

The inclusion of timothy is warranted on the moister soils, and in Otago-Southland district it also persists quite well under low rainfall. Being very palatable, it is closely grazed by stock and hence is often not noticed, but will persist well, even under close grazing. In one Invermay trial timothy remained constant at about 10 per cent. over 3 years under close grazing, whereas cocksfoot steadily declined.

Cocksfoot Dominant Mixture for Second-class Hill Country

	lb.
Cocksfoot	12
Perennial ryegrass	10
Crested dogstail	1
Montgomery red clover ..	4
White clover	3
	30

Crested dogstail is a good companion grass with cocksfoot, and 1lb. to 2lb. can be included in hill country mixtures. Being a good coloniser, it occupies bare spaces and is more or less permanent owing to its prolific seeding habit. Crested dogstail is not a true perennial and if not allowed to seed, will disappear in 2 to 3 years.

Crested dogstail and perennial ryegrass are sometimes described as "bottom" grasses, owing to their dense, close-growing habit. Cocksfoot and timothy on the other hand are very open in growth and are liable to be invaded by the weed grasses unless a bottom grass is sown in the mixture.

Mixture for High-fertility Soils

	lb.
Short-rotation ryegrass ..	15
Perennial ryegrass	15
Cocksfoot	4
Timothy	3
Montgomery red clover ..	3
White clover	3
	43

Cocksfoot, timothy, and red clover are good summer producers and withstand drought periods well. Where soil moisture is adequate or rainfall is high cocksfoot and red clover can be omitted.

Simple Mixtures for High-fertility Soils

	lb.
Perennial ryegrass	30
White clover	3
	33

	lb.
Short-rotation ryegrass ..	10
Perennial ryegrass	20
White clover	3
	33

Temporary (3 to 5 Years) Pasture for Winter and Early Spring Production

	lb.
Short-rotation ryegrass ..	30
Cowgrass	4
White clover	2
	36

Special-purpose Pastures for Summer Production

	lb.
Short-rotation ryegrass ..	5
Perennial ryegrass	5
Cocksfoot	12
Montgomery red clover ..	4
White clover	3
	29

Three pound to 4lb. of timothy may be included in the mixture.

Mixtures for Seed Production

For seed production mixtures are simple. Examples are given below. The seed is usually drilled at low rates. The higher grades of Certified seed, Government Stock, Pedigree, or Mother seed, should be used.

	lb.
Perennial ryegrass	10-15
White clover	2-3
	12-18

Perennial ryegrass is harvested in the first year and white clover in the second year.

	lb.
Cocksfoot	5-8
White clover	2
(drilled)	7-10

Cocksfoot seed is harvested each year.

	lb.
Timothy	3-5
White clover	2
(drilled)	5-7

Timothy seed is harvested each year.

▼ One of the molybdenum mowing trial areas. The plot on the left shows an excellent clover response to 3cwt. of superphosphate, 2½oz. of sodium molybdate, and 2 tons of lime per acre. The clover growth in the control plot on the right is poor.

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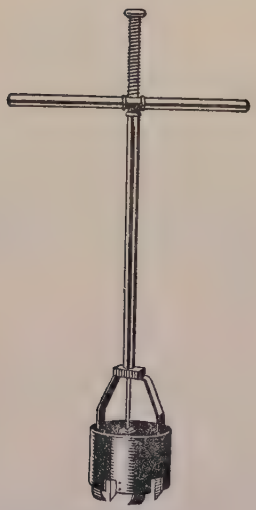

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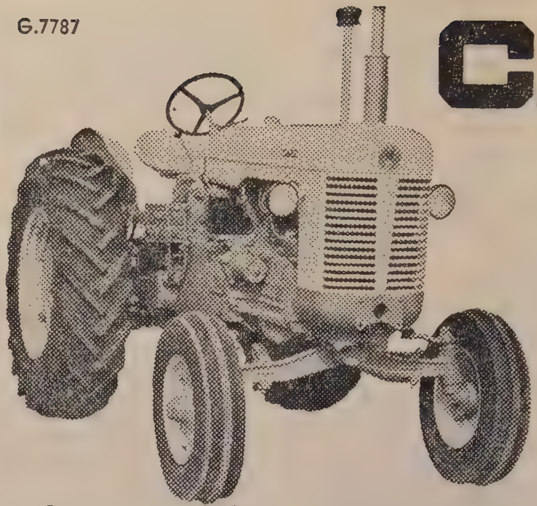

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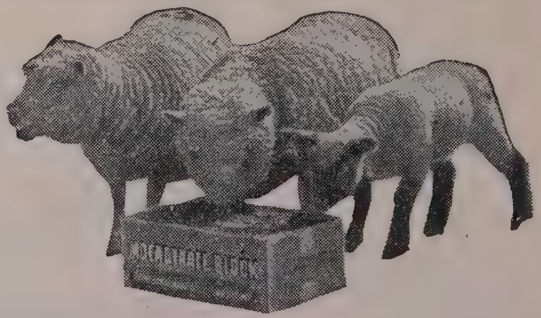

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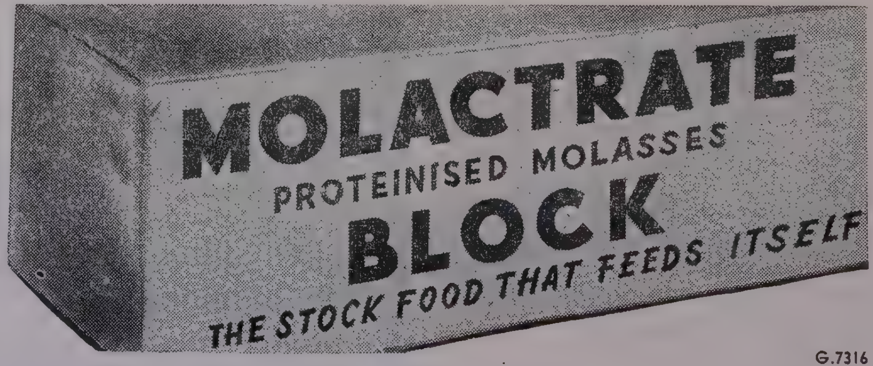

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A timothy seed production trial area at Invermay Research Station, comparing 7in. drilling (on left) and 28in. rows (on right).

	lb.
Montgomery red clover ..	5-10
Italian ryegrass or short-rotation ryegrass	20-25
(broadcast)	25-35

Italian ryegrass or short-rotation ryegrass is harvested in the first year and Montgomery red clover in succeeding years.

Fertiliser and Lime at Sowing

Where the ground has been limed for the previous crop or crops the lime content of the soil is probably sufficient and further liming may be unnecessary. The amount of phosphate applied will depend on the previous manurial treatment, but should be from 1½cwt. to 3cwt. per acre. It is better to put on two or three applications of 1½cwt. to 3cwt. each in the first year or two than one large application at sowing.

Trace elements, such as molybdenum, should also be used where trials have shown them to be necessary.

Sowing with Cover Crops

The practice of sowing new grass with a cereal cover crop is not recommended. Even sowing with rape is not advisable. The words "cover" and "nurse" crops are somewhat misleading, since these crops do little good and often irreparable harm. Often when a good crop of rape is obtained the grass is poor and vice versa. Pastures sown under rape often appear quite good at a cursory glance, but close inspection shows the clovers to be very thin and poor.

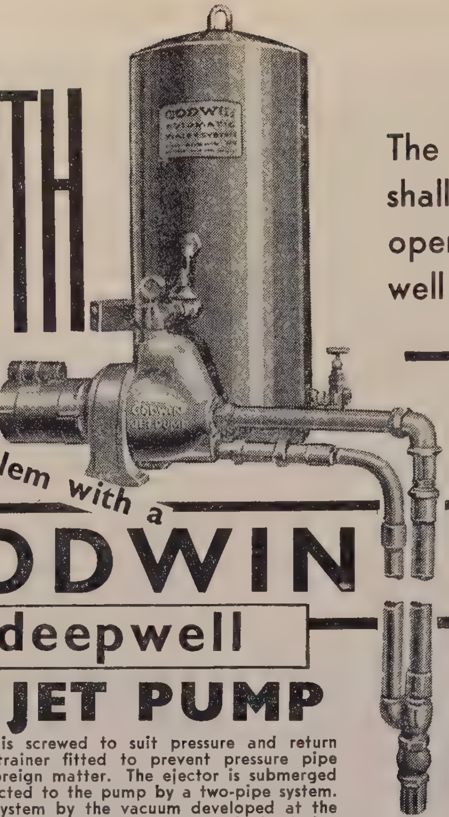
With a heavy seeding of the ryegrasses a good establishment of these species is often obtained, since they can tolerate the cover crop to some extent, and it is not realised how poor the establishment of the remaining grass and clovers species has been. As a result the sward is composed mainly of grasses for a season or two and it is 2 to 3 years before the clover content of the pasture has built up. By this time the sward has deteriorated and the better species of grasses have begun to disappear. As the first 2 or 3 years should be the most productive, any advantage of regrassing and sowing high-producing strains of grasses and clovers is nullified, and in the long run the seemingly expensive method of sowing new pasture alone after a fallow is the cheapest.

The suppression of white clover by a cereal cover crop is even greater than under rape, and few good pastures are established by this method. Red clover, however, establishes quite well under a cereal crop and this method may be used for sowing red clover for seed production.

GRAZING MANAGEMENT IN EARLY STAGES

Good management of the young pasture is important. One of the advantages of sowing grass without a cover crop is that the grazing can be better controlled. Trials have shown that young pasture should not be allowed to get longer than 4in. to 6in.

DEPTH



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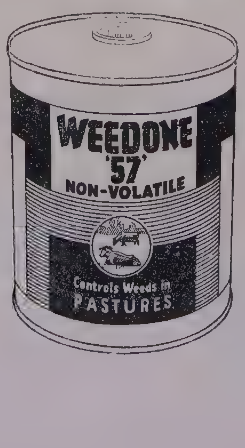

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if clover suppression is to be avoided. Early grazing has several advantages:—

1. Weeds are kept in check.

2. The trampling aids in the consolidation so essential for good establishment.

3. The slower growing species of grasses and the clovers are encouraged.

Young pasture sown in late spring or early summer may be used for flushing ewes and then spelled for late winter and spring feeding. If growth is long by the end of winter, maximum utilisation is effected by break feeding with fences in front and behind to avoid excessive damage.

Should the young pasture appear sickly and unthrifty during winter the use of nitrogenous fertilisers should be considered. Ammonium nitrate-lime or sulphate of ammonia will usually effect a quick recovery and give extra production.

Grazing during early spring should be lenient to encourage the slower growing grass species, such as timothy, which are eaten out under close set stocking. Grazing with large mobs with spells between grazings is the ideal, but where this is not possible cattle should be grazed with or after the sheep to control the long and rough growth. Close grazing during late spring and early summer will encourage clover growth, but overgrazing should be avoided or weeds and weed grasses may invade the sward.

MANAGEMENT IN LATER STAGES

Though the establishment period is the critical one, maintenance and management of the pasture in its second and later years is also important. To ensure good control of grazing, paddocks should be small.

Drainage and shelter are other factors often neglected and it is obvious that even the best strains of pasture species cannot produce their best under waterlogged conditions.

Harrowing and topping are widely used on dairy farms and could be more extensively used on other systems of farming.

Grass-grub and Porina Control

With improvement in the pastures there is often an increase in damage by grass-grub (*Costelytra* (*Odontria*) *zealandica*) and porina (*Oxycanus cervinata*), the subterranean caterpillar, and as a precaution DDT should be used on all second-year pasture in areas liable to damage. One application of DDT at 2lb. per acre will safeguard the pasture against attack for 2 to 3 years, and the price of DDT is small compared to the cost of renewing badly damaged pastures. A lookout should be kept for the fine earth casts of the porina and for dead patches of grass indicative of damage by grass-grub, and immediate treatment should be given to limit the damage. Treatment is usually warranted where counts show more than 8 to 10 grubs to the square foot. Flocks of starlings are often the first signs of grass-grub and porina infestation.

Maintenance of Swards

Maintaining a good sward depends largely on the grazing control and the topdressing programme. Under continued close grazing and set stocking species such as cocksfoot and timothy will not thrive and it is doubtful if they should be included in the mixture unless some effort is made to encourage their growth by spelling and cattle grazing. Continued set stocking, especially when combined with overstocking, quickly results in sward deterioration and the ingress of weeds, browntop, and other low-producing grasses.

Haying will result in an increase in the percentage of cocksfoot and timothy, but continued haying is unwise, as the sward opens up and clovers are suppressed.

Topdressing Programme

The importance of the topdressing programme cannot be overstressed. Adequate phosphate is frequently the key to good pastures, and to discontinue phosphate topdressing is the surest way to sward deterioration.

On the Invermay soil type nearly 3cwt. of superphosphate per acre each year is necessary to maintain the phosphate level. This does not allow for any build up. Thus on similar soil types heavy applications should be made in the first year or two to build up the phosphate level. The critical time is from 6 months to 2 years after sowing, so it is advisable to use say 9cwt. per acre during the first 2 years in 3 to 4 dressings and after that annual maintenance applications.

For out-of-season winter and early spring production autumn applications are the best. In Invermay trials heavy topdressing of up to 6cwt. per acre per year in March has given outstanding winter and spring production on a 6-year-old hill pasture. Production for the 1952-53 season was equivalent to a good Waikato pasture. Spring topdressing often gives its maximum response in October-November, by which time grass is usually so plentiful that the extra production cannot be efficiently utilised.

The liming programme should aim at an application of about 1 ton of lime every 4 to 5 years. However, soil tests can be taken to give a guide to the lime and phosphate requirement.

Molybdenum and other trace elements should be used where they are deficient. At Invermay spectacular responses have been obtained with molybdenum, especially on run-out pastures deficient in clovers. Molybdenum is not a substitute for lime and phosphate, but should be used with them. One application of 2½oz. of sodium molybdate per acre is sufficient for 4 to 5 years.

Competition of Pasture Species

As a result of vigorous clover growth induced by phosphate topdressing the nitrogen status is built up and the high-fertility grasses will flourish. Browntop cannot compete with ryegrass under conditions of high fertility, and it is only when the fertility falls (through lack of phosphate topdressing usually) that browntop can gain a foothold. In some trials under heavy phosphate topdressing ryegrass has replaced browntop. The balance is delicate and is easily swung one way or the other. As weed grasses will colonise bare spaces, it is important to get a good, dense establishment. Weeds also invade a sward opened up by overstocking.

In most hill soils browntop seeds are present and are not destroyed, even after several years' cultivation. One of the criticisms of direct regrassing is that browntop will "come in" and choke the young grass. This will not occur provided a good establishment is obtained and the topdressing programme adhered to.

Sweet vernal is sometimes a serious problem in late spring. During November-December sweet vernal may be a major contributor to the sward, but rapidly runs to seed, and its production is low for the remainder of the year. Browntop is mainly a summer producer. Yorkshire fog, the other main weed species, is mainly an autumn producer, but produces some growth in spring and summer.

In a good sward the aim is to have short-rotation ryegrass contributing in winter and early spring, perennial ryegrass in late spring, and cocksfoot, timothy, and clovers mainly in summer and autumn.

Special-purpose pastures may be grown to provide production at specified times. Thus short-rotation ryegrass or *Phalaris tuberosa* may form the basis for a winter producing pasture, and timothy and cocksfoot with Montgomery red clover may be used for summer production. These species withstand drought conditions well.

Few soil types are incapable of growing high-producing pasture. The cost of sowing good strains of high-producing grasses and clovers and maintaining these with regular applications of fertilisers is amply repaid through increased carrying capacity and production.

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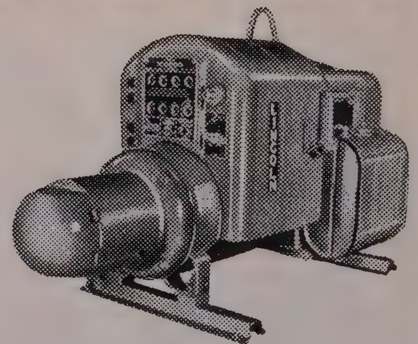

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Maintaining Winter Egg Production in the Household Poultry Flock

By J. H. JONES,

Poultry Instructor, Department of Agriculture, Oamaru

THE problem of getting pullets into lay and keeping them laying confronts every poultry keeper at this time of year, as under natural conditions the birds tend to produce most eggs in September, October, and November. Warm housing and good feeding are more than ever necessary if birds are to maintain good egg production through autumn and winter uninterrupted by such annoyances as neck moulting or autumnal colds.

THE commercial poultry farmer whose livelihood depends on a peak production of eggs during winter, when high prices rule for eggs, makes much use of artificial light to achieve his aim. The light impinging on a bird's eyes stimulates its pituitary gland, which leads to increased egg production.

[Niederer

Pellets or moist mash can be fed in a trough as illustrated. The dryness of the floor litter shown here is essential for absorbing moisture in the droppings.

Reminders for June

1. There is often no supply of greenfeed at this time of the year. Even if some is available, it is likely to be of poor quality and lacking in vitamin A, which is essential for good health and efficient production in laying pullets. Now is the time to include 3 tablespoons of a fish oil containing 2000 units of vitamin A per gramme to every 10lb. of mash. Mix the oil into the mash thoroughly.

2. Keep the litter in the laying shed stirred up once weekly. This will prevent the litter matting and becoming damp. Damp litter can cause an outbreak of colds which put an immediate brake on egg production.

3. Don't allow birds to sleep in the nest boxes overnight. It may be warmer there than on the perches, but birds which sleep in the nest boxes overnight foul the litter in these boxes and the result is dirty eggs.

4. Spend 5 minutes after dark one evening and feel the crops of the pullets. They should be full of food. If not, either the birds are probably not in lay and unlikely to come into lay or insufficient food is being fed, more particularly in the last feed of grain. If there are no signs of grain being left over either in a trough or in the litter and the crops are only half or less filled, increase the feed of grain in the late afternoon. It is likely that the birds are receiving insufficient food.

For most household flocks, however, night lighting is impractical and the householder maintains winter production by careful management with special emphasis on keeping the birds warm and dry and inducing them to eat the maximum amount of a well-balanced diet. Feeding correctly is one key to success and one which is likely to present a puzzle to the beginner, but before the relation between feeding and egg production is considered in detail there are certain points to be understood.

Breeding and Environment Factors

Breeding and environment have as much influence on a pullet's performance as feeding, and unless these two factors receive as much attention, the most scientifically balanced diet will not bring out her best. Rate of production is inherited, but it can be prevented from full expression by faulty management. On the other hand the best methods in the world will not induce a 100-egg bird to lay 200 eggs whether she is put under lights or not; therefore pullets must first be bred to lay.

Environment is important because good results cannot be expected from birds which are overcrowded or kept during winter in houses and runs which are dirty, cold, and damp.

Feeding

In feeding for winter egg production the aim should be to provide the birds with material to keep them in condition to lay. Their tendency to do so is inherited, but care must be taken during the birds' growing period to ensure that they are not fed on a ration containing an excess of protein and so are forced into production before they are ready. Precocious birds which begin to lay when still not fully grown will tend to lay small eggs for a long time and also are more vulnerable to ovarian troubles like prolapsis.

If the birds are fed an ad lib. dry mash diet, an additional midday feed of wet mash and household scraps or pellets will be beneficial as the days grow shorter. The consumption of

WINTER EGG PRODUCTION . . .

grain should be encouraged particularly at this time, and the birds should be given all they will eat at the afternoon feed. If the birds are being fed dry mash ad lib. and have begun to lay, a hopper containing extra protein in the form of meat meal should be before them at all times, as it has been found that by this method winter egg production will be assisted and the birds will balance their own diets. Emphasis must be placed on the necessity of regular feeding during winter. Experience teaches that it is more essential to feed the birds on time during winter than in summer, as a large proportion of the food, especially the last feed at night, is used to maintain body heat.

Keeping the Birds Warm

To maintain good winter egg production it is essential that the birds have access to warm quarters. If these are not provided, much of the energy derived from the food eaten by the bird, instead of being converted into eggs, will be devoted to maintenance of its body. If the house is reasonably constructed and draught proof, the floor on which the bird spends most of its time must first have attention.

A dry floor with a good depth of litter is vitally necessary to keep birds warm. The litter must be dry and deep and absorbent enough to dilute the droppings and render them harmless. Dampness, whether from outside sources such as roof leaks, from water troughs, or from the droppings, encourages the survival of parasites and must be avoided at all costs. Every effort should be made to keep the floor dry, as damp conditions often lead to an outbreak of colds among the birds which will shatter hopes of good winter egg production.

The establishment of a good, deep litter requires care, but fully justifies the trouble involved. The litter can comprise straw, wood shavings, or sawdust, or a combination of all three. If available, dry cow or horse manure placed on the bare floor of the house and covered with the new litter makes an excellent start for the bacterial action necessary for the breakdown of the litter to a friable state.

The build up of the litter should begin in late summer at a depth of 3in. to 4in., and by autumn, with the steady introduction of new material, the litter should be about 6in. to 8in. deep. With care the litter, which is cleaned out annually, should remain dry over winter, but any caked areas must be broken up with a fork and if bad, removed from the house.

A light dusting with hydrated lime and a forking over periodically will also help to keep the litter dry and interesting to the birds. The afternoon grain feed (a good handful to every bird) should also be scattered in the litter so that the birds can do their job in keeping their house dry, warm, and clean.

It is important to have a minimum of 4 to 5 sq. ft. of floor space per bird in a house. If the area per bird is less, there will be overcrowding, which is the major cause of many troubles in the poultry run. It is impossible to stress too much the evils of overcrowding birds in a small, intensive house. The interior of the house should be light, as this is an important factor in stimulating the birds to lay. A dark interior caused through insufficient window space or spraying with tar or old oil seems to encourage external parasites and listlessness among the birds.

Birds object to damp, dull, cold, and sunless conditions. Taking a pride in the hens, their house, and equipment is a major factor in maintaining winter egg production and a successful poultry unit.

Ruakura Farmers' Conference Week

THE programme for the eighth Farmers' Conference Week of the Department of Agriculture's Animal Research Station, Ruakura, comprises subjects of vital interest to the farming community. The conference will open at Ruakura on Tuesday 12 June and will continue until Friday 15 June.

A feature of the week, as in other years, will be the field day on Wednesday. Such a day does much to prove to farmers the importance to primary production of co-operation between the research worker and the man on the land. Modern facilities of transport and display make it possible for farmers to assimilate readily the diverse work being done at the sheep and dairy sections at Ruakura and at the Hill Country Research Station at Whatawhata.

On the evening of the field day at the Ruakura Staff Centre an address "Farmers' Wills" will be given by Mr. R. Cato, manager, Guardian Trust and Executors Co. Ltd., Hamilton, and Mr. P. G. Harkness, solicitor, Hamilton.

Besides topical papers by leading New Zealand agricultural research workers, other addresses which will be keenly followed will be those by Mr. W. L. Keen, senior statistician, New Zealand Meat and Wool Boards' Economic Service ("Patterns of Expenditure on New Zealand Sheep Farms") and Mr. H. M. Caselberg, Supervising Valuer, State Advances Corporation ("Financing New Farmers").

Dr. C. P. McMeekan, Superintendent, Ruakura Animal Research Station, will give two papers which will be of particular interest. Among other speakers will be Mr. N. H. Taylor, Director, Soil Bureau, Department of Scientific and Industrial Research, and Mr. P. W. Smallfield, Director, Extension Division, Department of Agriculture.

An outline of the programme is as follows:—

SECTION FOR SHEEP FARMERS
(Tuesday 12 June)

Morning: "The Management of Rams for a High Lambing Percentage" (D. G. Edgar, L. J. Lambourne, and I. J. Inkster); "Rearing Thrifty Hoggets" (E. A. Clarke).

Afternoon: "Feeding Ewes for Lower Lamb Losses" (L. R. Wallace); "Guaranteeing 95 per cent. Calving in Beef Cows" (D. MacFarlane); "Patterns of Expenditure on New Zealand Sheep Farms" (W. L. Keen).

Evening: Film evening and discussion.

SECTION FOR ALL FARMERS
(Wednesday 13 June)

Field day.
Evening: "Farmers' Wills" (R. Cato and P. G. Harkness).

SECTION FOR ALL FARMERS
(Thursday 14 June)

Morning: "Important Causes of Disease Losses in Farm Livestock" (D. C. Dodd); "Crossbred Beef" (C. P. McMeekan); "Growing Fodder Crops for Sheep and Cattle" (G. S. Robinson).

Afternoon: "The Use of Soil Surveys to the Farmer" (N. H. Taylor); "Management of Pasture on Pumice Lands" (P. W. Smallfield); "Weed Control" (F. B. Thompson).

Evening: "Financing New Farmers" (H. M. Caselberg).

SECTION FOR DAIRY FARMERS
(Friday 15 June)

Morning: "Strip versus Paddock Grazing of Dairy Cows" (C. P. McMeekan); "The Relationship of Size and Yield to Efficiency in Cows" (L. R. Wallace); "Lessons from Twins" (J. C. Gerring).

Afternoon: "The Effect of Different Intervals between Milking on Production" (P. J. Brumby); "How to Manage Pigs on the Dairy Farm" (D. M. Smith); "Present Knowledge of Sterility in Dairy Cattle in New Zealand and Overseas" (T. J. McClure).

Winter Show Dates

THE following are the dates and venues of winter shows:—

*29, 30, 31 May, 1, 2, 4, and 5 June—Waikato Winter Show Association at Hamilton.

*31 May, 1, 2, 4, and 5 June—Otago A. and P. at Dunedin.

*13, 14, 15, and 16 June—Taranaki Metropolitan A. and P. at New Plymouth.

14, 15, 16 June—Te Kuiti and District Winter Show Association at Te Kuiti.

26, 27, 28, 29, and 30 June—Whangarei A. and P. Winter Exhibition at Whangarei.

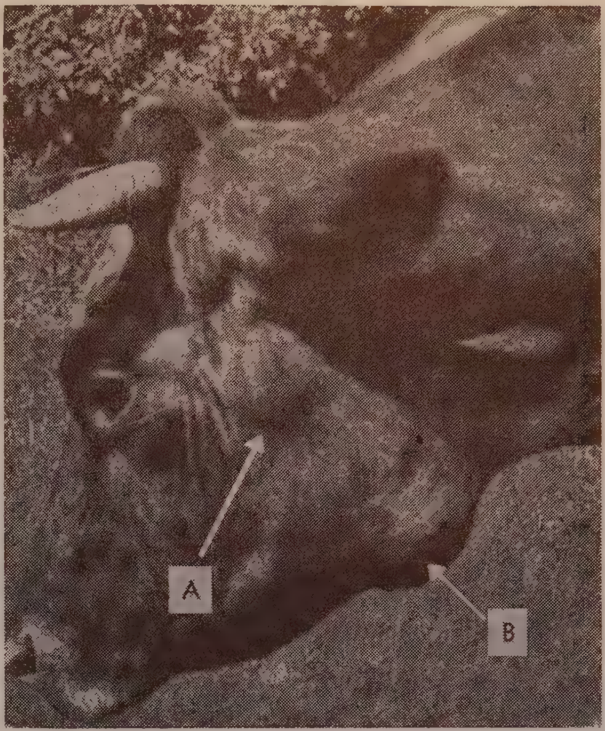
* The Department of Agriculture exhibit will be staged at this show.

The Spread of Tuberculosis on the Farm

THE subject of bovine tuberculosis has been adequately covered in previous "Journal" articles, but in spite of publicity and control measures taken by the Department of Agriculture the incidence of the disease appears to remain the same from year to year, and possibly is increasing. In this article V. E. Senior, Veterinarian, Department of Agriculture, Tauranga, discusses some misconceptions in relation to the disease and emphasises the role the tubercular udder plays in spreading infection.

TUBERCULOSIS is an infectious disease. Like other infectious diseases it can be spread directly by contact between infected and healthy stock and, to a certain extent, indirectly by contamination of utensils and surroundings. However, indirect spread is mainly through bail feeding and salt licks, and the problems connected with the housing of cattle in other countries do not obtain here. In fact, experience has shown that the elimination of the infected animal as detected by the tuberculin test can reduce the amount of infection to manageable proportions after only one herd test, and it is not unusual to have grossly infected herds cleared up after 2 or 3 tests, provided the interval between the tests is not too long.

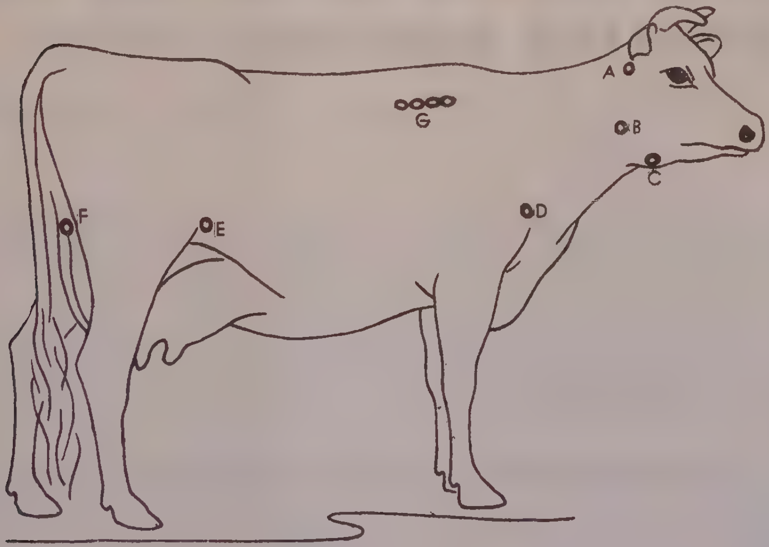
In other words, the main reservoir of the disease is the infected animal, and it is a fallacy to blame low-lying or swampy country as a cause of tuberculosis, though such country might and does contribute to its spread by favouring the survival of the germ. Swamp country can be just as clean as hill country, but spread of disease is more favoured and the persistence of infection greater under moist, sheltered conditions. Wet country might be favourable to the spread of tuberculosis, but is not a cause of it.



A bad case of tuberculosis. The parotid (A) and submaxillary (B) nodes are affected.

Introduction of Disease

In practically all cases disease is introduced on to the farm by the purchase of tubercular stock, and from that stage the build-up gradually occurs, an insidious spread taking place unknown to the owner. By the time the purchased animal, or animals, is showing signs of disease such as loss of condition, chronic cough, and swollen lymph glands, particularly those about the head, at the base of the ear, or in the throat, and causing snoring, much damage has probably been done and a chain of events initiated leading up to an infected herd, with the regular appearance of further clinical cases.



Position of lymph nodes commonly affected with tuberculosis and which can be readily detected by sight or touch. The swelling caused by tuberculosis is hard. A—Parotid. B—Pharyngeal. C—Submaxillary. D—Prescapular. E—Precrural. F—Supramammary. The foregoing are all superficial. G—Mediastinal; these are inside the chest and when enlarged may press on the gullet, causing recurring bloat.

The next stage is the introduction of the disease through the milk into calves being reared for replacements, thus ensuring a degree of infection sufficiently lethal to kill in early maturity and sufficiently widespread to constitute a major disaster.

A tubercular udder in a self-contained herd can shatter a replacement programme for at least a year, and one herd in the writer's district lost 30 heifers in less than 18 months.

Progress of Disease

The unfortunate part is that a tubercular udder is not always apparent until the later stages of the disease, and by the time it is discovered a whole season's calf crop might be infected. Tuberculosis of the udder, when it has reached the stage of being detected by touch, may be felt as a hard, lumpy portion of tissue. contrasting sharply with the

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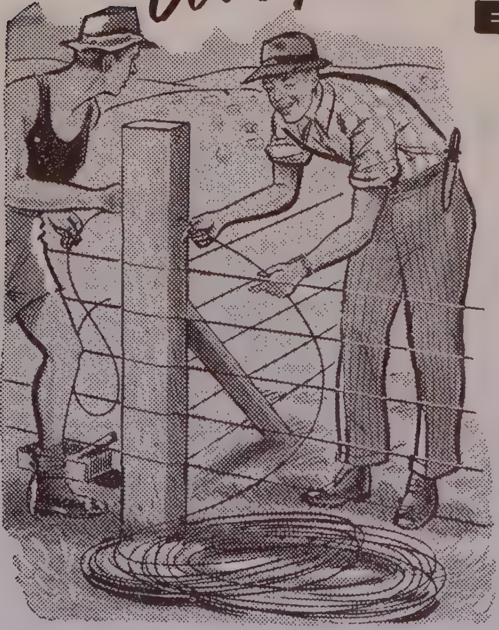

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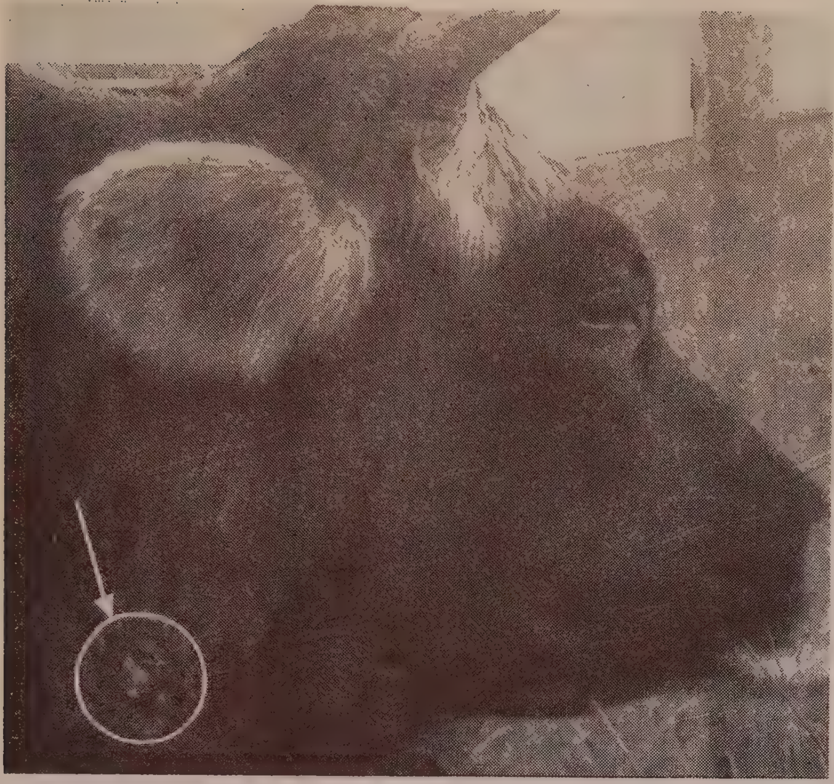


An open clinical case of tuberculosis in a cow. Because of the infection spread by pus from such an abscess animals affected like this one should be culled and condemned.

springy feel of a healthy quarter. This hard portion gradually increases in size and if left long enough, may spread to the whole quarter. The condition usually attacks one quarter and more often the hindquarter than the forequarter.

The milk appears unchanged until the later stages, when it becomes watery in appearance, but only in the last stages does uncomplicated tuberculosis of the udder display the changes and clots in the milk associated with non-tubercular mastitis and with which every dairy farmer is familiar. In the final stages the tissues of the udder break down and gross changes in the milk become apparent, but as a rule by this time the appearance of other clinical signs has led to the destruction of the animal. Though an experienced man might suspect by palpation of the udder that it is tuberculous, a microscopic or biological examination of the milk is necessary for confirmation.

Any progressive enlargement or hardening change in the udder tissues detected by palpation immediately after milking, particularly if the animal has not had an attack of the more familiar forms of mastitis accompanied by changes in the milk, should be suspected and be the subject of a special inquiry by a veterinarian. Enlargement of the supramammary lymphatic gland at the base of the udder is another valuable sign when considered with the other evidence, and though this gland might swell under the influence of the simpler forms of mastitis, all swelling should be suspected, particularly in the absence of ordinary mastitis.

The tuberculous udder is the menace of the self-contained herd, and once a case has been diagnosed and there are reasons for believing infection has spread to the calves through the milk, the Department of Agriculture should be approached on the best method of tackling the problem.

Not infrequently inquiries into milk-borne infection are initiated when a line of pigs is found badly affected at the abattoir. If the vender of these pigs is known, he is usually approached by the Department and an investigation or series of investigations conducted in an effort to find the source of infection. In such cases the Department can be of real practical value and all cases of tuberculosis in pigs should be investigated.

Best Safeguard

Rearing by farmers of their own replacement cattle is obviously the best safeguard against the introduction of disease, but even in some herds which have been self-contained for years the disease has become so firmly established that it is perpetuated from generation to generation by direct and indirect contact. This unfortunate state of affairs is quite frequent, but generally the self-contained herd is the answer to the problem, and the incidence of tuberculosis in such herds is much lower than in other herds and often is negligible.

Owners of self-contained herds who have reason to believe they might be relatively free of tuberculosis should on no account bring replacement stock on to the farm without first having such stock tested by a veterinarian. A cheap buy at a local dispersal sale could prove a costly mistake that would take years to rectify.

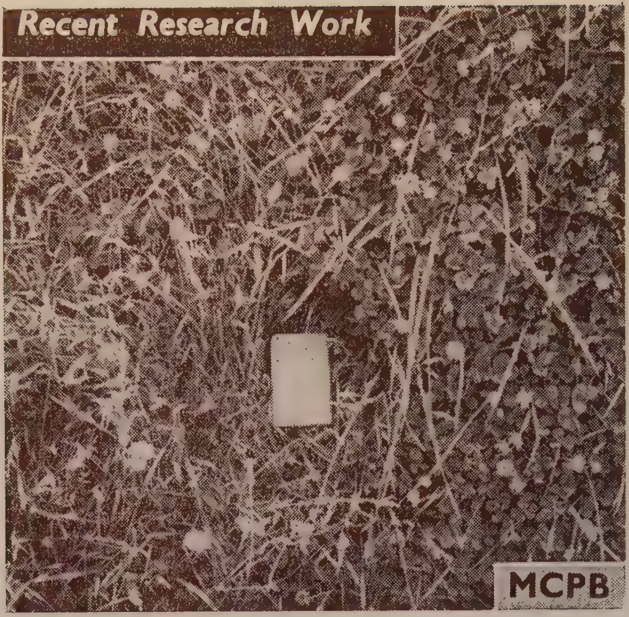
Once tuberculosis is established on the farm the rapidity of spread depends largely on farming practices. Clinical cases should be reported as soon as suspicions are aroused and not left to add to damage already done. This is most essential not only because of the obvious risk of dissemination of more infection as long as the animal is alive, but also because it is a better step than the not infrequent custom of tipping carcasses into gullies on the back part of the farm where they gradually rot and disintegrate, contaminating the surrounding ground and drainage. Under such conditions infection can persist for up to 3 years or more. The practice of disposing of carcasses in this manner cannot be too strongly condemned. Even if bloat was the immediate cause of death, tuberculosis can still be present.

Bail feeding contributes to the spread of tuberculosis, and in herds where each cow is accustomed to passing through the same bail at milking time a line of reactors is occasionally disclosed all of which made a habit of using the same bail. This method of feeding can, however, be used with impunity when the herd is disease free.

Regardless of the method of spread cows with tuberculous udders are the most dangerous for the reason that they are easily overlooked and may be responsible for a mass infection of calves kept for replacements. It is futile retaining such animals. They should be tested and reactors disposed of, and a minor loss not allowed to become a crippling blow. The tuberculin test is the only solution to the problem, because under normal husbandry conditions infected calves appear healthy and usually there is no visual evidence of disease until the animal is almost ready to come into the herd and pay for the time and labour invested in it as a calf. As a business proposition the tuberculous calf returns a poor dividend.

◆

Recent Research Work



A NEW hormone preparation based on gamma butyric acid will shortly be available commercially. The formulation available will be the sodium salt of 2 methyl, 4 chlorophenoxy gamma butyric acid. This parent acid has been abbreviated to MCPB. The preparation available will be sold under the trade name of "Tropotox". It is related to the MCP type of hormone preparation, but differs from this material in that it has to be broken down by plants to MCP before it becomes herbicidally active. Only certain plants have the power of breaking down MCPB into MCP and thus this material can be used with greater safety than MCP or 2,4-D on crop and pasture plants that do not have this power.

As soon as experimental supplies of MCPB and closely related 2,4-DB compounds became available the Extension Division of the Department of Agriculture laid down field experiments to evaluate these chemicals. Most of the trial work is still of a preliminary nature and most results must be regarded as interim.

EXPERIMENTAL WORK TO DATE

The trial work to date has compared MCPB and 2,4-DB formulated as salts and esters with the standard MCP and 2,4-D preparations. Detailed trials have been laid down on clover species, lucerne, peas, and new pastures. A wide range of annual and perennial herbaceous weeds has also been treated. Fairly definite results are available on the application of the chemicals to annual weeds, but a further season will have to elapse before results are available from the treatment of perennial weeds.

CLOVERS: WHITE, SUBTERRANEAN, AND RED

Of all the hormone materials commercially available to date MCPB preparations have proved the most selective toward clovers. Even seedling clovers have not been damaged permanently by rates of up to 1lb. of MCPB per acre. White, subterranean, and red clovers at an advanced stage of growth appear to suffer little or no check at rates of up to 2lb. per acre. Oil soluble esters of MCPB and 2,4-DB have been more severe than the sodium salt, but this could probably be attributed to the solvents used in the esters.

HEADING PHOTOGRAPH: Effect of applying to pasture 2,4-D (left) and MCPB (right). No reduction in clover growth occurred in the area treated with MCPB.

LUCERNE

Preparations of MCPB are less toxic to lucerne than preparations of MCP and 2,4-D, but are more severe in their effect than preparations of 2,4-DB. Even at the 1lb. rate their action is sufficiently severe not to permit their use in lucerne.

PEAS

Trial work with peas indicates that MCPB is less severe than MCP and 2,4-D. Further work may show that MCPB will be a valuable weedkiller for most varieties of peas. The place of 2,4-DB is still to be determined.

ESTABLISHING PASTURES

Because MCPB does little damage to clovers at an early growth stage, it may be used to control weeds in newly sown pastures. This means that many of the weeds can be controlled at the seedling stage of growth before they offer severe competition to the establishing pasture species. MCP and 2,4-D preparations could not be recommended before the pasture was at least 6 months old. All standard available hormone preparations affect clover too severely to be used in young pastures.

WEEDS

The following weeds show susceptibility to MCPB at rates of 1lb. to 2lb. per acre: Annual and perennial thistles at early growth stages; annual buttercups; most flat weeds; seedling docks; seedling wireweed; seedling willow weed or redshank; seedling cornbind; cruciferous weeds such as hedge mustard and wild turnip; storksbill at 2lb. rate only; seedling fat-hen; seedling redroot.

RESISTANT WEEDS

The following weeds are resistant to MCPB: Rushes; mature docks; cape weed; yarrow; chick weeds.

CONCLUSION

Undoubtedly the sodium salt of MCPB is particularly valuable for weed control in leguminous crops such as clovers and peas. It cannot be recommended for the control of weeds in lucerne or beans. On the whole the sodium salt of MCPB has not been as effective as the oil soluble esters of MCPB. These esters have been slightly more toxic than the corresponding salts at equivalent rates of application, but this could probably be due to the toxicity of the solvents used in the manufacture of the esters. Preparations of MCPB control a smaller range of weeds than MCP and 2,4-D. For weeds susceptible to MCPB, equivalent preparations of MCP and 2,4-D give more positive control at lower rates of application. At higher rates of application, that is, 2lb. acid equivalent per acre, the differences in toxicity are not so great. In some instances the esters of MCPB in particular have exerted a higher toxicity to weeds than equivalent MCP or 2,4-D preparations. Examples of such weeds are willow weed or redshank and wireweed.

The development of MCPB and related materials has affected the relative value of MCP and in particular 2,4-D for pasture weed control. Both MCP and 2,4-D at over 1lb. per acre give some clover damage. 2,4-D is usually more severe on clovers than MCP, mainly because the most toxic form (the oil soluble esters) is largely used. This reduction in clovers is usually most severe in early spring, late autumn, before the pastures are fully established, and in pastures where the clover is not growing strongly and has poor powers of recovery. The use of MCPB is warranted in these cases even though a higher rate of active principle per acre will probably be required to obtain the same weed control. In the meantime MCP and 2,4-D will still have to be used for weeds not controlled by MCPB such as rushes and established docks.

—*L. J. MATTHEWS*

▲ Though chou moellier is grown in the Manawatu primarily as a winter feed crop, in recent years it has gained in popularity as a crop for summer feed.

Provision of Summer Feed on Manawatu Dairy Farms

By B. A. J. SMITH,

Fields Instructor, Department of Agriculture, Palmerston North

THE climate generally in the Manawatu district is very suitable for dairy farming, with the average annual rainfall of 38in. to 40in. fairly well spread over the year. In spite of a good climate, however, it is not always possible to attain high production under all-grass farming as is done in some of the more favourably situated dairying districts. Often during mid-summer and late summer a serious dry period occurs when pasture growth slumps badly and dairy production falls away alarmingly. This happened during the summers of 1953-54 and 1954-55, when the rainfall from December to March was nearly 4in. below the average figure of 13½in. This dry period underlines the great need which exists for a summer crop on most farms in the district.

FARMS that did grow a crop carried the herds through the dry period with only a slight drop in production, and when the autumn rains brought pasture growth away butterfat production rose, in many cases to its normal level. However, on many farms depending solely on pasture the production level dropped so much that some cows were dried off during late summer and autumn and production from those which were kept in milk recovered only slightly and then fell away steadily until the end of the season.

The soils in those parts of the Manawatu where dairy farming is intensive vary greatly. In the north around Halcombe they are derived from sandy mudstones and tend to lie wet where drainage has been neglected. Pasture growth on such areas is slow in early spring. Around Feilding and Palmerston North the soils derived from alluvium are fertile and also are poor draining, though growth comes away more quickly in spring. Farther south, in the Opiki district, soils are a mixture of peat and alluvium and on the coast is a strip of sand country where soils vary from heavy, wet sands to light, extremely dry sands.

Pasture Growth

Pasture growth in the district in early spring is usually good provided both drainage and fertility are satisfactory. Where drainage is inadequate growth is often retarded by the extremely wet soil conditions through winter and is dependent almost totally on the rate at which the soil loses its excess moisture. Once growth does start, however, it is vigorous until the onset of hot, dry weather in December, when lack of moisture and higher temperatures cause it to ease off. This is general in most years and sometimes the lack of growth is serious if rainfall is inadequate for any length of time, and production can then be seriously affected.

Calving begins late in July and is usually completed by September, except for a few late-calving cows. Since production begins before the spring flush of growth, use is made of chou moellier crops and conserved pasture which is shut up the previous autumn and held through the winter until required. This with hay and/or silage is ration fed in breaks to the milkers

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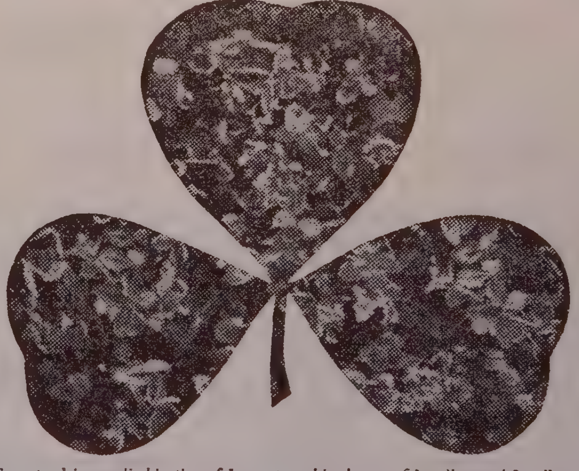

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after calving and lasts well into spring provided sufficient pasture has been shut up and utilised efficiently. Excess pasture growth during spring and early summer is conserved as silage and/or hay and used with a crop, if one is grown, in either summer or winter periods of feed shortage.

Need for a Summer Crop

A dry period may occur in which growth is limited and production drops if insufficient milk-producing feed is available to the herd. The necessity to provide a succulent, palatable feed which can be used efficiently to produce milk during such summer and autumn dry periods needs no emphasis. Often the production of cows on pasture alone slumps so greatly during dry weather that little recovery is possible with the autumn flush. With a crop, however, production can be maintained fairly evenly throughout the whole period.

Requirements of a Crop

Any crop to keep up production must fulfil certain conditions so that the dairy herd may exist almost entirely on it, with possibly the only extra feed being hay or silage.

First, a crop sown for the summer dry period must be capable of growing well in the cooler, spring months, when the rainfall is adequate, and yet be able to store in its tissues a succulent, nutritious material which will resist the effects of the hot, dry weather.

Secondly, such a crop must yield a large quantity of forage which will be ready for stock when it is required. Also, the amount of forage produced must be considerably more than would have been produced from the pasture which was ploughed. Unless the crop is capable of such production, the butterfat yield could possibly be depressed instead of being increased.

Thirdly, the crop must be suitable for growing early in the season and should establish rapidly enough to smother any weed growth that may appear.

Fourthly, it should be adaptable in utilisation and be suitable for feeding either in situ or by cutting or pulling. It must be able to stand until it is required and not deteriorate unduly in feed value. If it is conservable as silage when it is not required, as in a wet summer, it is an added advantage.

Finally, the residue should be such that it does not interfere greatly with the recultivation and subsequent grassing out.

Value of a Crop

Besides the obvious use of a crop to provide food for stock when other sources fail, there are other advantages in summer crops.

A crop can take full advantage of the fertility which has been built up over the years through good farming practice, so that when the area is regrassed with the better strains of grasses and clovers it is generally in much better condition than it was before ploughing. Cultivation and cropping give the old turf more time to rot down, and levelling, if needed, can be done during the cultivation periods. If the fertility is low, the growing of a crop before grassing out will often increase the fertility provided the crop is fed off on the area on which it has

Stock break feeding on saved pasture. Calving begins in late July and is usually over by September, except for a few late-calving cows. As production begins before the spring flush of growth, use is made of chou moellier crops and conserved pasture shut up the previous autumn and held through winter until required. This with hay and/or silage is ration fed in breaks to the milkers after calving and lasts well into spring if enough pasture has been shut up and used efficiently.

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been grown and is not cut and carted off.

A good summer crop can often give a greater yield of digestible nutrients per acre than silage and its use during a period of feed shortage can reduce the amount of silage required and thus conserve it for use during winter and early spring. Also, there is less loss of nutrients with a good crop than with silage and probably less labour is required in feeding off a crop.

Finally, the greatest value of a summer crop on a Manawatu dairy farm is that it fits in extremely well with the regrassing programme. The usual practice is to plough in spring, sow. utilise the crop during summer, and sow to new grass in autumn. The area is out of production for a relatively short period, produces a good crop, and is then fit for resowing with often a minimum of cultivation. By this rotation it is possible to maintain and keep up to date the regrassing programme, eliminate as far as possible the spring sowing, and grass out at the most desirable time of the year. An added advantage is that the paddock intended for the summer feed crop can be utilised during the previous winter as a paddock on which to feed out hay and silage to stock. The fertility of depleted areas can thus be built up while other paddocks can be closed to stock, pugging of pastures on wet country being thus avoided.

It must not be overlooked that there are certain disadvantages in cropping, but with a summer feed crop these are far outweighed by the benefits. Cultivation costs of the crop can be high and a large number of implements are usually required for cropping. However, if the cultivation is satisfactory, the cost of the crop is balanced by the value of the increased butterfat produced. Added to this is the value of the new pasture. Also, if a general regrassing programme is being practised, the necessary implements will be on hand anyhow.

The crops that fulfil the conditions outlined are rather limited and careful thought must be given in selecting one that is suitable. The main considerations are first, the suitability of the crop to the particular area and soil type, and secondly, the ability of the farmer to sow the crop at such a time that it will be available for feeding when most required.

Suitability of the crop is the most important consideration when a crop is chosen. Such factors as soil conditions, soil fertility, time of requirement, and access for feeding are all important. Though some crops will stand wet conditions, others will not tolerate excessive moisture. Some crops demand high fertility and others are suitable for less fertile conditions, though no crop will produce well if the fertility is too low.

As both hay and silage are valuable in a dry summer, they can be regarded as complementary to crops and justify their inclusion as summer feed crops.

The time the crop will be most needed deserves some thought. It may be possible, and warranted, to sow two kinds of crops, one for early use and the other for use later in summer. Also to be considered is the possibility of cultivating and sowing the crop early enough for it to reach maturity. Again, two different crops, one with a shorter growth period, may be the answer. In parts of the Manawatu it is impossible, owing to wet conditions, to get paddocks ready early enough to sow crops which take some time to mature. A quicker maturing crop must then be selected. Access to the crop, though not of great importance when a regrassing programme is being carried out, must be considered. A temporary race may have to be erected across a paddock or perhaps fences may be altered so that access can be obtained without another paddock being crossed. Access to water must also be provided for the herd while it is on the crop. Shortage of seed and the consequent high price may also be a factor in determining the crop to be grown.

The amount of summer crop required by cows depends on the season, but generally 1 acre of reasonably good crop will be sufficient for 10 to 12 dairy cows in milk.

Hay and Silage

As both hay and silage are of value in a dry summer, they can be regarded as complementary to crops and therefore justify their inclusion as summer feed crops.

The basis of all feeding is the provision of adequate fodder throughout the year, either as grass or as a crop. Pasture will not fill this requirement entirely and it is still, to a certain degree, a seasonal crop. It is impossible for a farmer to stock to the level required so that all the spring growth of pasture is utilised by grazing. If this were done and a farm stocked to its spring carrying capacity, there would be a great shortage of feed for the rest of the year. The converse is also true in that it is impossible to stock to the level where feed from pastures alone is available for the whole year. Under such a system wastage in spring would be enormous and the farming method inefficient. However, the conservation of excess pasture growth in spring as either hay or silage does much to correct the stocking level and maintain a relatively even rate of stock feed requirement in a normal season.

Silage is often compared with hay, but it could be more appropriately

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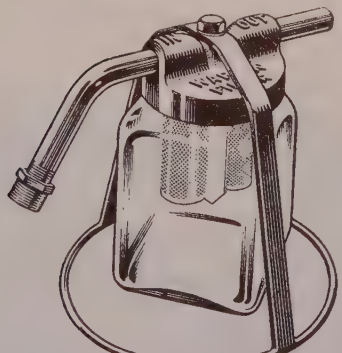

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Discing after ploughing old pasture in preparation for a maize crop. For any crop good seed-bed preparation is necessary. Thorough cultivation is repaid by increased yields.

compared with the pasture from which it is made. Well-made silage is easily digested, has a fairly high nutritive value, and is a first-class feed to maintain production in a dry summer, when fed with either a feed crop or with pasture. It has the added advantage in that being cut early it produces a good aftermath while growth conditions are good. A silage aftermath from a pasture containing appreciable amounts of cocksfoot and red clover can be extremely valuable for cows in dry weather if it is not grazed too heavily and is utilised efficiently. A further advantage with silage is that if little is needed in any one season, it can be kept until required with very little deterioration.

The making of hay, though an excellent method of conserving surplus pasture growth, is often left until too late in the season, with the result that dry weather has set in before cutting and little or no recovery growth is available for grazing. This lack of growth often persists until well into winter and it is possible to recognise hay paddocks many months after they have been cut.

Irrigation

Irrigation has proved of value in the district provided watering begins before dry weather has slowed growth and provided sufficient water is available close at hand. With the exception of certain places with artesian supplies irrigation is confined almost wholly to properties that border rivers or strong-running streams. Even then it is possible to irrigate only those pastures nearest the source of water. If supplies of water are adequate and irrigation is economical, there is no doubt irrigation of pastures would do much to ease the drop in production in a dry year.

Turnips

White-fleshed turnips are the most popular summer feed crop in the district, because they produce well over a wide range of fertility and climate. They do best, however, when there are neither extremes of dry conditions nor heavy rains. Cool, moist conditions are required, and the amount of sunshine the crop receives is not important. Provided sufficient moisture is present in the soil for the growth of the crop, turnips will tolerate fairly hot weather. In soils with a reasonable moisture-holding capacity turnips will grow well through December and even into January. On the stiffer clay soils late-sown crops often suffer through lack of moisture and produce little feed. In such areas turnips alone are a somewhat risky crop, and more feed is obtained by sowing separate areas of turnips and chou moellier provided fertility is high enough for the growth of the latter crop.

Good seed-bed preparation is necessary for a successful crop. This requirement is not confined to turnips, as any crop will amply repay thorough cultivation by increased yields. Early ploughing is essential for adequate rotting of the turf. A fine, moist tilth is required for even germination and for quick growth of the seedlings. The soil should not be worked when it is wet and adequate consolidation should be obtained with a roller. A final light harrowing immediately before sowing is of great value in killing young weed seedlings and assisting consolidation.

Throughout the district practically the whole of the crop is broadcast on the seed-bed and covered with a set of light harrows behind the broadcaster. The seed is sown at 14oz. to 16oz. per acre with reverted superphosphate, serpentine superphosphate, or one of the proprietary crop manures. The thicker sowings tend to reduce the bulb size, and this becomes an important factor in the feeding when bulbs are pulled and fed out.

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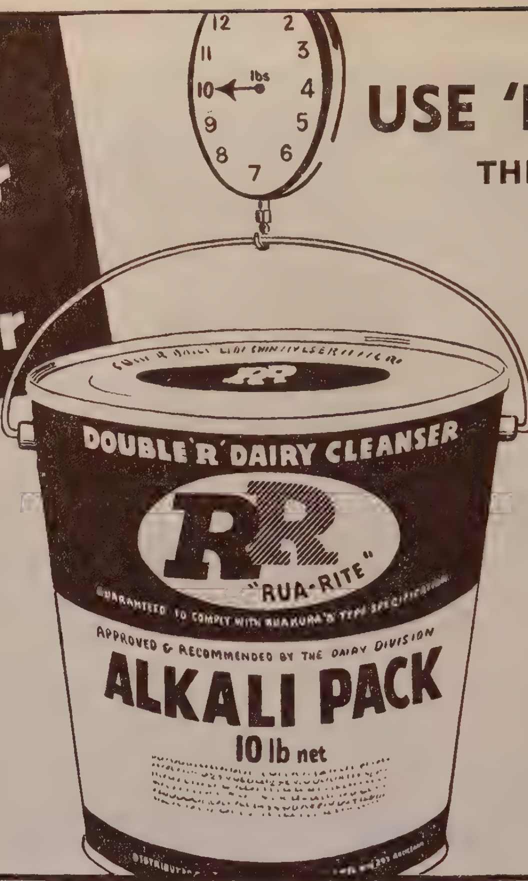
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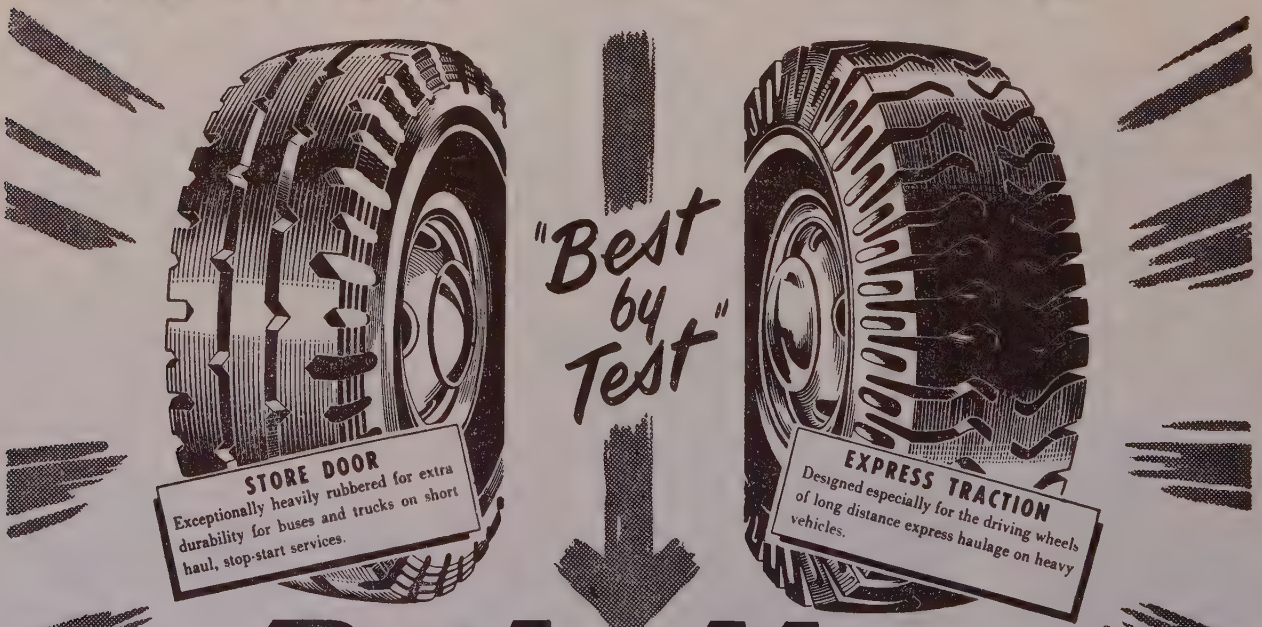
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Pests

In some years turnip crops suffer badly from aphis attacks and large areas can be severely affected in a short time. Early sowings appear to help, as attacks when the bulbs are well grown do less damage. When bulbs are small or just beginning to form damage can be quite severe. Recent work with insecticides has also given good results in aphis control, and provided equipment is available, gamma isomer BHC at ½lb. of active ingredient per acre in water gives good control when sprayed on to crops.

Varieties

The most common turnip variety sown is N.Z. Green Globe, popular because of its reliability, firm flesh, and good keeping qualities. It grows well in all but the poorest of soils and is suitable on the sandy soils, alluvial flats, or the rolling clay country. A practice now quite common is to sow one-third of the area with either N.Z. Red Globe or N.Z. York Globe, both of which come away early and give feed sooner than the Green Globe, with which the remaining two-thirds of the area is sown. York Globe is also valuable for late sowings which have been delayed by weather or when an area needs to be resown.

Feeding

The turnip crop is utilised either by feeding off in the paddock or by pulling and carting off. When the crop is fed in situ the herd is given a new break each day and so worked across the crop, the size of the daily break depending on the crop and the herd numbers. A relatively narrow strip each day will give good utilisation and very little is wasted. It is often wise to allow for imperfect utilisation and sow a slightly larger area. Stock are not kept on a break continuously, since the danger of feed taint in the cream is possible. This danger is largely overcome by feeding turnips immediately after milking and then turning the herd on to pasture if available or feeding hay and silage. When the bulbs are pulled and fed out the intake can be better controlled and the danger of taint is somewhat reduced.

There are advantages in both methods of feeding. Feeding in breaks involves less time and labour, but some of the crop is lost by trampling and fouling. Pulling is laborious, but little of the crop is wasted when it is carted out. A major fault is the removal of fertility in carting out and the depletion of the paddock which grew the crop.

Turnips are an excellent milk-producing feed in a dry summer. They tend, however, to lower the cow's condition, but this can be overcome by feeding them with a fibrous material such as hay, silage, or maize.

A possible disadvantage of turnips is that once they have reached maximum growth they will not stand until winter, so that any portion of the crop which has not been used when the crop is mature should be ploughed under.

Chou Moellier

Though chou moellier is grown in the Manawatu primarily as a winter feed crop, in recent years it has gained in popularity as a crop for summer feed. It is a reliable crop, resists insect attack fairly well, and recovers reasonably well from disease. It needs a fairly fertile, free-draining soil for maximum production and care must be taken both in the selection of the area and in the growing of the crop. It requires a growing period of 4 to 5 months to produce the desired yield, so that a crop required in January is best sown early in September. On some dairy farms in the district ploughing in August or earlier is extremely difficult and often impossible because of wet soil. On many properties then where drainage is inadequate ploughing and working the ground earlier than September or October are impossible and generally some other quick maturing crop must be sown to provide at least some feed in the early part of summer.

As the crop in the early stages of growth requires a free-draining soil, it is often impossible to sow before October on the heavier clay soils. Therefore, where possible a safer policy is to sow a small area of turnips for early feed to maintain production until the chou moellier, of necessity sown late because of wet soil conditions, is ready.

Some farmers have overcome the difficulty of early ploughing and cultivation by ploughing the previous autumn and sowing oats for late winter and early spring feed. This gives a good supply of green material when pasture growth is low, raises the soil fertility by feeding off the crop with stock, and allows earlier cultivation in spring than if the land were to be ploughed out of old pasture.

Fertiliser

Chou moellier is a gross feeder and requires and responds well to liberal dressings of fertiliser. Though nitrogenous fertilisers are not often used, it is felt that more use could be made of them with chou moellier, except of course where the soil fertility is already high. Since it is usually a run-out pasture which is ploughed for a

[*National Publicity*

Cutting chou moellier for feeding out to a dairy herd. A common practice is to cut part of the crop in the morning and spread it over the paddock in which the cows will be grazed that night, so that it has wilted considerably before being eaten. This tends to reduce tainting of the milk.

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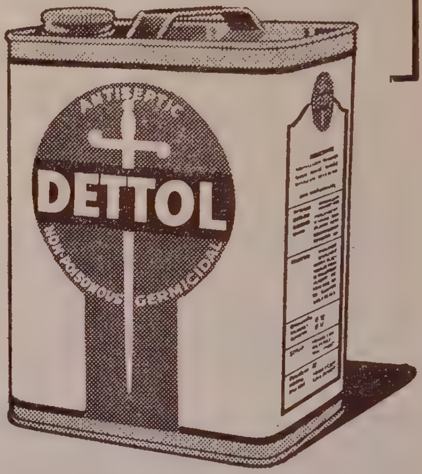

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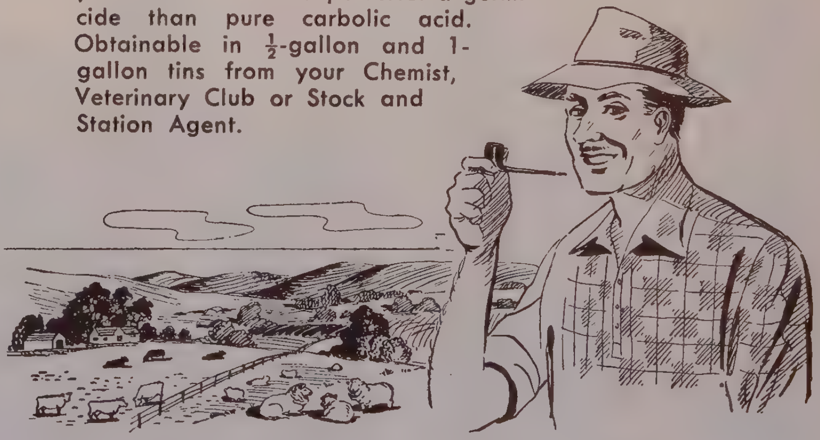

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In a favourable season on a good seed-bed maize is ready for feeding during late January either in breaks or cut and carted out.

crop, the fertility, particularly the nitrogen level, of the soil is frequently quite low. English practices indicate that good results can be expected with nitrogen on chou moellier crops. As with turnips, the fertility of the area to be ploughed can often be built up by heavy stocking and concentrated feeding out on it during winter.

Sowing

If the land is clean, the seed can be broadcast and lightly covered with harrows, but on country where weeds are serious it is often sounder to sow in wide rows and intercultivate until the crop is tall and leafy enough to suppress weeds. Few dairy farms, however, have drills or the necessary equipment for this system, so that many farmers have made use of turnip ridgers for the sowing of the crop.

The seed is usually sown at 2lb. per acre, a heavier seeding producing a dense, leafy crop with thinner stalks. It is generally recognised that the leaf has a greater feed value than the stalk, and the lighter stalks do not cause difficulty during subsequent cultivation. Superphosphate at 2cwt. to 3cwt. per acre is sown with the seed and sulphate of ammonia or some other nitrogenous fertiliser is of value when the ground has been ploughed out of an old clover-deficient pasture.

A good crop is ready late in January and like turnips may either be fed off in breaks or cut and carried to the cows in another paddock.

Feeding

Utilisation is generally quite good provided stock are given only sufficient to clean up each day. Usually the leaves of the new break are first eaten and then cows return to the old stalks and clean them up. Like turnips, chou moellier can cause tainting in cream, so that it should be fed immediately after milking. A common practice is to cut a portion of the crop in the morning and spread it over the paddock in which the cows will be grazed that night, so that it has wilted considerably before being eaten. If it is fed in breaks, it may be cut in the afternoon with a mower and the fence shifted over the mown material, which is then eaten by stock next morning. Either procedure allows wilting, which tends to reduce the tainting.

Though not providing a complete diet for the herd, chou moellier is a valuable supplement when fed with pasture in a normal season or with hay or silage in a dry season. In cultivation before regrassing the remaining stems will, if utilisation has been reasonably good, cause no difficulty in their disposal.

Containing from 12 to 14 per cent. of dry matter, chou moellier is very digestible, is richer in proteins than are turnips, and is a good milk-producing food. In addition, if it is not required in summer, it will stand in good condition right into winter without deterioration.

It does, however, present some difficulties not encountered with other crops. Provided seed supplies are assured, there is no reason why chou moellier will not increase in popularity as a summer feed crop.

Maize

Maize as a greenfeed has become fairly popular as a summer and autumn milk-producing feed on the better drained, more fertile areas of the Kairanga and Opiki districts. It does well only if sown when soil temperatures have begun to rise, and does not make much growth when the ground is cold. Maize requires, in common with other crops, a good seed-bed and unless cultivation is adequate it will not produce to its maximum. It is sown in late October or November, later sowings seldom being successful. The seed is usually harrowed or disced on to the seed-bed at 2½ to 3 bushels per acre with 3cwt. to 4cwt. of superphosphate or a proprietary crop manure.

Feeding

In a favourable season on a good seed-bed the crop is ready for feeding during late January and is either fed in breaks or cut and carted out to stock. Maize is susceptible to damage by high winds, which may blow many plants over. Both break feeding and cutting then become difficult.

A practice becoming popular is the growing of separate areas of maize and turnips and feeding some of each. This increases the intake of fibrous material and does not cause the same drop in body-weight as does the feeding of turnips alone. Another point is that in a season when it is not required and if a forage harvester is available for chopping up the green material, maize can be made into silage. Maize has the disadvantage of often reaching its maximum growth too late in the season to be of greatest value. It quickly becomes over-mature and fibrous if left for any length of time and at this stage it is almost useless as a stock food.

Millet

Millet has had limited success in the district, its use being restricted because of its low yield per acre. It does well under dry conditions and grows extremely quickly, often being ready for use 5 to 6 weeks after sowing. For this reason it is of value when another crop has failed or when a late sowing is unavoidable. Millet prefers warm soils and can be sown as late as November or December and still give a reasonably good yield of green material. It is usually drilled or broadcast at 25lb. to 36lb. per acre with 1½cwt. to 2cwt. of superphosphate or crop manure.

Feeding

It is generally break fed, though on several Manawatu farms it is mowed and carted off to dairy stock. Once it reaches the 12in. stage it tends to become rank and unpalatable and loses much of its value as a milk producer if left to grow too long. Its main use is as a catch crop and it is unlikely ever to replace turnips or chou moellier except under special circumstances.

Necessity for Summer Feed

There is no need to emphasise the necessity of some suitable feed crop to supplement pasture during summer and autumn. Even if the cows are only kept in milk by supplementary feeding during the dry period, production will often recover when pasture growth is restored by rains. Not only are crops valuable for feeding to stock, but they are extremely important as preparation for reseeding permanent grasslands. Comparisons between herds grazed solely on pasture and those grazed on pasture with a supplementary crop show the great benefits to be obtained from the extra feed provided by the crop. In spite of minor difficulties, the use of crops to supply feed in a dry summer could be profitably extended to practically all dairying districts.

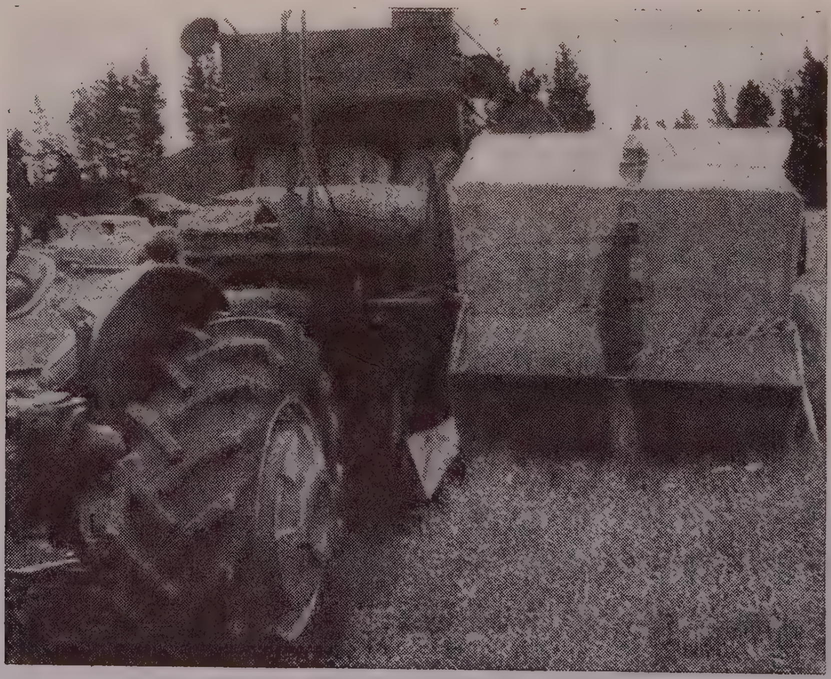
Adjustment for Header Reel in a Weedy Crop

A FARMER in the Highbank district of Ashburton County had considerable difficulty in autumn 1955 in harvesting a crop of linseed on account of weed growth. The accompanying photograph shows how he adapted the reel of his header to enable him to head the linseed direct.

The linseed was sown in October, but the weather was comparatively dry until mid-December, when 6in. of rain fell in a few days. This resulted in excessive weed growth, mainly of cornbind (*Polygonum convolvulus*). By harvest time (February) this weed had entangled itself in the heads of the linseed and was dragging the crop down.

Mowing the tangled crop was not possible and direct heading was attempted with little success. As the linseed was cut the wooden bars on the reel of the header would catch it and carry it round on the ends of the reel and throw it off the header or it would gradually build up on the bars until the farmer removed it. The farmer cut some sacks lengthwise and stitched them end to end to encircle the reel, making sure that the sacks enclosed the free ends of the bars. This resulted in the crop being harvested successfully and quickly, instead of the harvest being laborious and frustrating with a possible big loss of grain.

—*W. A. McKELLAR,*
Fields Instructor,
Department of Agriculture,
Ashburton



Header bars covered with sacking to aid heading of a weedy linseed crop.

Hydraulic Valves Useful to Farmers Developed by Department

Manufacturers' Inquiries Invited

Two hydraulic valves that should be useful to farmers, one that will automatically operate an electrically driven pump supplying a reservoir or tank and another, a clock-controlled one, that will switch the water supply from an operating to a static spray irrigation line at a predetermined time, have been developed to the prototype stage by the Department of Agriculture. Neither valve has been patented and firms interested in their manufacture can obtain details and drawings from the Engineer, Department of Agriculture, Box 2298, Wellington.

Something Different in Domestic Glasshouses

By W. E. WARD,

Horticultural Inspector, Department of Agriculture, Nelson

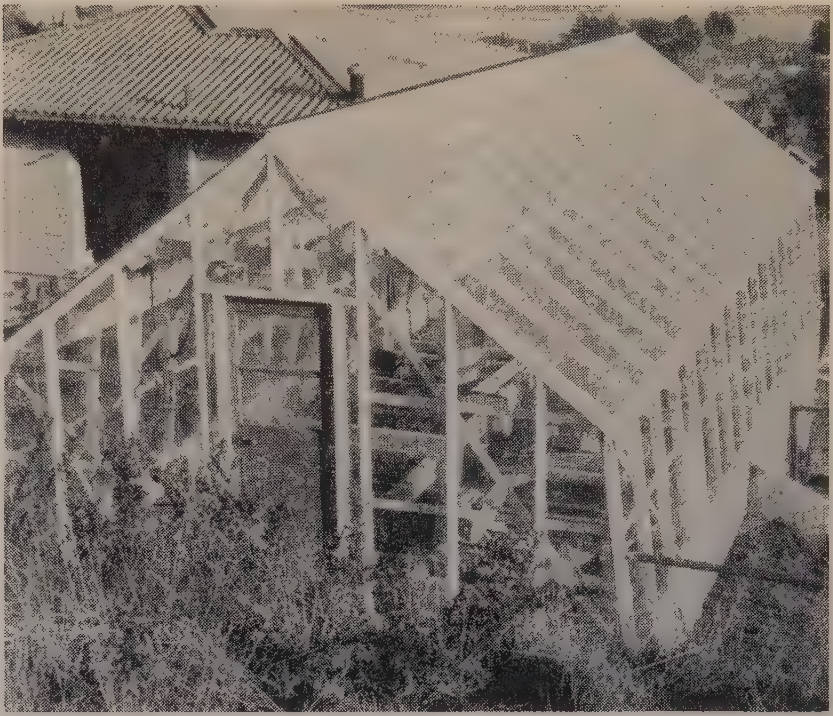
SMALL domestic glasshouses have become very popular in many parts of New Zealand over the last few years. This is particularly evident all along the South Island west coast, where rainfall ranges from 60in. to 200in. a year. The climate on the greater part of the coast is pleasant, though high rainfall and occasional cold winds make desirable some protection for vegetable growing if the best results are to be obtained.

ILLUSTRATED is an unusual and space-saving glasshouse built by Mr. N. Ellery, of South Beach, Greymouth.

Owing to the steepness of Mr. Ellery's property, reasonably level sites for gardening and building were at a premium. When constructing his concrete garage, which is elevated and built partly into the bank, Mr. Ellery used concrete for the roof also and built a small glasshouse on it. He made a low concrete wall round the edge of the roof to act as foundations for the glasshouse walls, and concrete troughs on top of the roof to be filled with soil in which to grow plants.

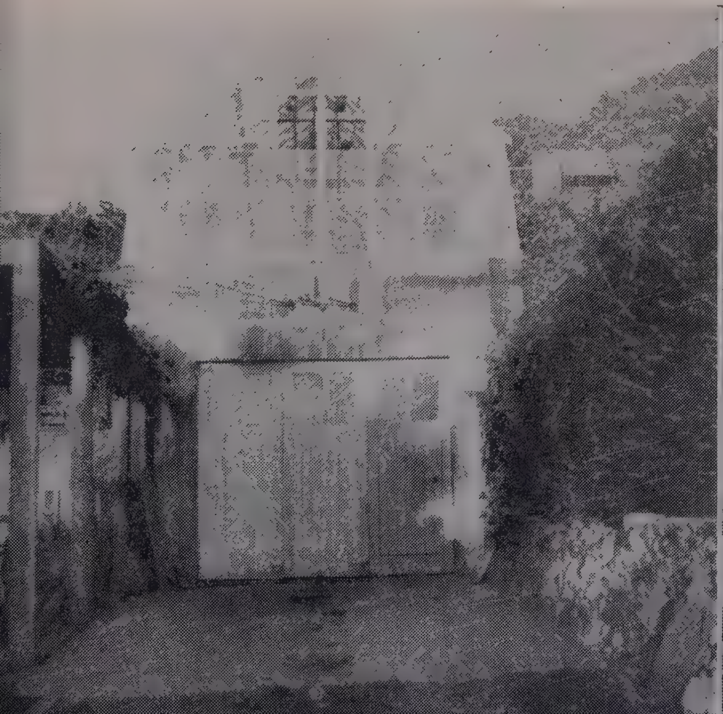
Several drainage holes were provided at the bottom of the side walls of these troughs.

The result of Mr. Ellery's ingenuity and forethought, as the illustrations show, is a very useful and pleasant glasshouse on a site which would otherwise not be used.

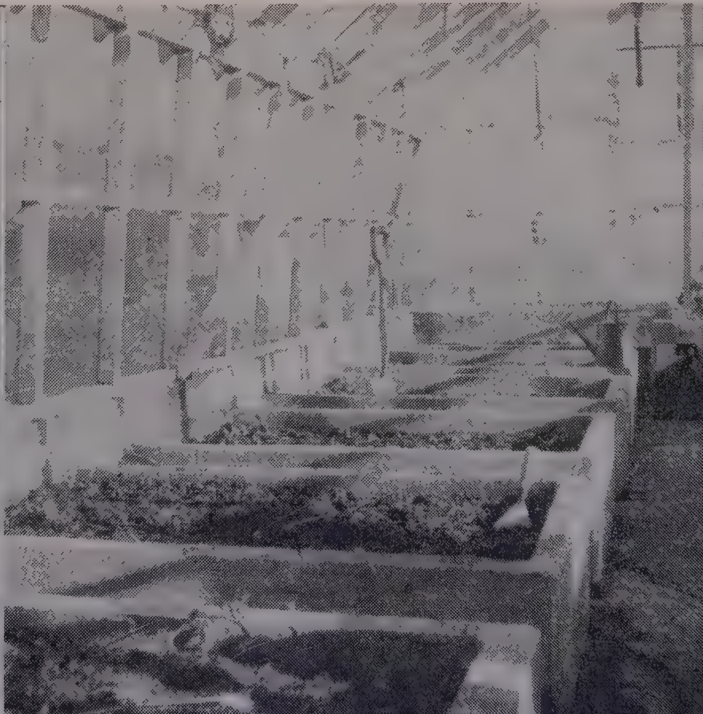


▲ The glasshouse built on top of a garage.

▼ The garage with the glasshouse above.



▼ Concrete troughs on one side of the glasshouse.



Developing Tussock Grassland in Waimate

HEADING PHOTOGRAPH: Typical country on which responses to superphosphate have been obtained.

By J. SYMONS, Fields Instructor, Department of Agriculture, Waimate

THERE is a considerable area of tussock country in Waimate County at an altitude of from 1000ft. to 2500ft. and with an annual rainfall of approximately 25in. which could be vastly improved by aerial topdressing and oversowing. Not withstanding that excellent results have been obtained by farmers who have been able to carry out this work, only a limited area has been done up to the present.

THE high initial costs involved in an extensive topdressing programme and, to some extent, the feeling that increased production will not cover the cost, have often been a deterrent. Besides, it is only in the last year or two that rabbits have been brought sufficiently under control to enable any such work to be worth while.

Results at Waihaorunga

That it is possible to carry out an extensive topdressing and oversowing programme at present has been well demonstrated by Mr. A. D. MacKenzie, of Waihaorunga, who has increased his stock from 2000 sheep and 30 cattle to 2850 sheep and 130 cattle in about 4 years.

Mr. MacKenzie's farm at Waihaorunga is about 22 miles west of the coast and 18 miles by road from Waimate. It consists of 2500 acres of easy to steep tussock country, most of which lies at an altitude of between 1200ft. and 2000ft. The annual rainfall is about 26in., and though the effectiveness of much which falls during summer is reduced by drying winds, the country often benefits from light, misty rain from the east.

No agricultural work is done on the farm, as the limited area which could be safely cultivated is very inaccessible and would necessitate extensive fencing. The soil in this area consists of a mixture derived from greywacke and loess which responds well to lime and phosphates.

The original vegetative cover consisted of hard tussock (*Festuca novae zelandiae*), blue tussock (*Poa colensoi*), traces of silver tussock (*Poa caespitosa*), and danthonia, with snowgrass (*Danthonia flavescens*) on the dark faces. Since the area was occupied, species such as chewings fescue, Yorkshire fog, sweet vernal, barley grass, browntop, some cocksfoot, catsear, and traces of white and suckling clovers have largely taken possession.

Improvement Programme

Topdressing

Mr. MacKenzie began his development work in the autumn of 1950 by topdressing an impoverished 80-acre holding paddock at the homestead with 1 ton of lime and 1½cwt. of superphosphate per acre. At the same time, the paddock was oversown with 4lb. of Montgomery red clover and 2lb. of white clover. In the following spring and summer the response was outstanding, and whereas previously the holding of stock in this paddock for any length of time, particularly during shearing, had proved a constant worry, the position was now reversed, for it was found necessary to carry stock on the area right through summer to keep the clover growth under control.

An excellent response to superphosphate had also been obtained on a trial plot established on tussock country during the spring of 1950.

As a consequence of these encouraging results a further 100 acres of rolling tussock country which could be traversed by transport was over-

County with Topdressing and Oversowing

sown and topdressed with superphosphate at 1½cwt. per acre in the autumn of 1951. At the same time 20 acres of flat land which had been ploughed, possibly 50 years before, was topdressed with lime at 1 ton per acre plus the phosphatic fertiliser.

Results were again spectacular and since then the following areas have been topdressed with superphosphate:—

SUPERPHOSPHATE PER ACRE

	Acres		Cwt. per acre	
Autumn 1952	1200		1	
Spring 1952	240		1½	
Autumn 1953	720		1½	
Autumn 1953	240		1½	+ 1 ton of lime
Autumn 1954	1200	(second)	1½	
Autumn 1955	1500	(second)	2	(molybdenised)

In all, 405 tons of superphosphate and 350 tons of lime have been applied.

Oversowing

When topdressing Mr. MacKenzie has generally oversown with the following mixture:—

	lb.
White clover (seconds)	4
Montgomery red clover (seconds)	2
Cowgrass (seconds)	2
Cocksfoot	2
Dogstail	1

Excellent clover establishment has been obtained with both autumn and spring sowings. However, autumn sowing is favoured, as there is sufficient cover on this class of country to obviate danger from frost lift and the clovers get a good chance to become well established in spring before the onset of dry summer weather.

The establishment of the grasses, especially cocksfoot, has been slow, but this has probably been due to the low seeding rate. A higher seeding rate would be more satisfactory, but the high cost of seed prohibits this at present. Nevertheless, there is now a good sprinkling of cocksfoot in the improved sward.

With the exception of spelling for about 2 months after oversowing, no other changes to the usual management practices have been made or found necessary. On this run it is the general practice to send the hoggets and 2-tooths down country to winter feed for 2 months and to graze rotationally the ewes and mature dry stock over the various tussock blocks during winter.

Costs

The application of 1½cwt. of superphosphate per acre, which seems to be the minimum rate for satisfactory results, has cost approximately £1 8s. per acre. The cost of handling 1 ton has been as follows:—

	£	s.	d.
Superphosphate	11	10	0
Cartage to run	1	10	0
Aerial sowing	3	15	0

To this must be added the cost of seeds for oversowing. Until now this cost has been between 12s. to 15s. per acre, but it is expected that for future sowings the cost will be much lower, as the establishment and reseeding of clovers to date has been excellent and it is not considered that further sowings will be necessary for some time.

Thus, the current over-all costs, including cost of material, freight, and distribution charges, approximate £2 per acre.

Results

Stock

From 1942 to 1952 stock numbers remained fairly static at about 2000

▼ Shelter is necessary on the hill country and Mr. MacKenzie has started to provide shelter belts. A belt of 3-year-old Oregon pines is shown here.

be independent with the

OLIVER OC3

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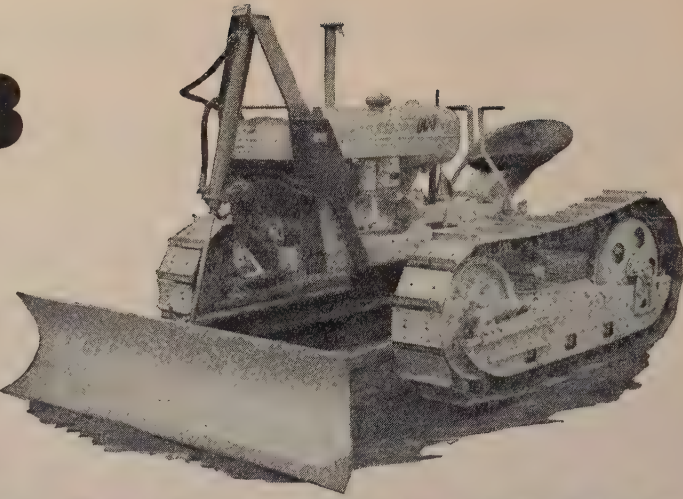

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Corriedale sheep and 20 to 30 dry cattle. Today the farm is carrying 2850 sheep and 130 cattle, which includes 75 breeding cows.

The increases in carrying capacity are illustrated in the following table:—

INCREASES IN CARRYING CAPACITY 1951 TO 1956

Season	Ewes	Hoggets and dry sheep	Total sheep	Cattle
1951-52	1400	600	2000	30
1952-53	1450	617	2067	25
1953-54	1840	660	2500	60
1954-55	1880	820	2700	100
1955-56	2050	800	2850	130

Lambing percentages have increased from an average of 80 to 85 during the previous 10 years to 93 in 1954-55. In 1955-56 it was 101 per cent. on ewes put to the ram and nearly 900 more lambs were tailed than in 1951-52.

In the last 2 years there has been a significant increase in the wool weights per sheep. Between 1942 and 1952 the wool clip was between 14,000lb. to 16,000lb., an average of 7.5lb. per sheep. In 1953-54 the weight per sheep showed an increase, but these figures are disregarded, as pre-lambing shearing was discontinued in that year and the ewes were carrying 15 months' wool when shorn. In 1954-55 the wool clip was over 23,000lb., an average of 8.5lb., and this year was 26,500lb., an average of 9.3lb. per sheep.

In the past 5 years wool weights per acre have increased from 5.6lb. to 10.6lb.

Another outstanding feature of the benefits to be derived from topdressing and oversowing is that Mr. MacKenzie was able this year, for the first time, to draft fat lambs off the mothers, despite one of the driest summers on record being experienced.

Sixty per cent. of the wether lambs were drafted off the ewes at the end of January and killed out at an average weight of 33.44lb. The remainder were sold as forward stores. It is considered that in future years by spelling a block before weaning these lambs could also be fattened.

Clovers in an area of snowgrass which was burnt in 1952 and oversown and topdressed with 1½cwt. of superphosphate per acre in 1953 and topdressed again with 2cwt. of superphosphate per acre in 1954.

Cattle can play an important part on the tussock grassland in keeping roughage under control.

Pastures

The introduction of vigorous growing legumes to the tussock grassland and good utilisation of all the resultant growth has led to

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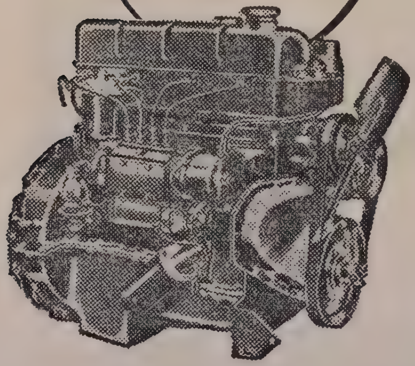

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a vastly improved sward. After 4 years the higher-fertility-demanding species such as cocksfoot and dogstail are showing up well in the sward, and low-producing grasses like chewings fescue and browntop are responding to the topdressing and increased nitrogen in the soil and are being eaten more readily by stock. The improvement in the palatability of browntop is of some importance, as this plant has spread fairly rapidly in recent years through much of the tussock country and is not normally very palatable to stock. Hard tussocks, though tending to thin out slightly in places, are mainly vigorous.

Influence of Cattle

The use of cattle for controlling excessive growth of roughage in gullies and on the darker and damper faces cannot be too greatly emphasised. Though the numbers carried by Mr. MacKenzie are not large, they have done a good job in keeping one of the major species in such areas, Yorkshire fog, under reasonable control. Under lax management Yorkshire fog will not only produce a large amount of unpalatable sheep feed, but it also tends to suppress the clovers and cause deterioration of the sward.

Cattle have also proved of great value in controlling snowgrass, especially when it has been burnt before topdressing.

The removal by burning of the coarse, unpalatable growth characteristic of snowgrass has not only afforded cattle a chance to control subsequent regrowth, but has also ensured a good establishment of clovers with oversowing. The results obtained by Mr. MacKenzie are such that he firmly believes that the burning of snowgrass can be reduced to a minimum and possibly eliminated on many of the dark faces. Burning of the remainder of the tussock country was discontinued many years ago.

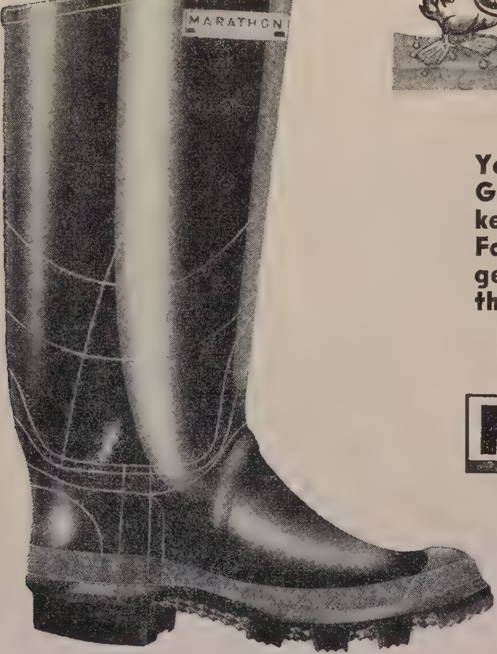
Though Mr. MacKenzie has solved many of the problems associated with an extensive topdressing and oversowing programme on tussock hill country, many still remain to be answered. One which is foremost in the minds of many farmers who have carried out such work is how often is it necessary to topdress to maintain production. Present indications are that topdressing with 1½cwt. to 2cwt. of superphosphate twice in 4 or 5 years may be sufficient, but this will have to be proved.

The results so far obtained by Mr. MacKenzie have been extremely good. Of special significance is the fact that he has had no difficulty during the past dry season in carrying the increased stock numbers so essential if full value is to be obtained from the capital expended on development.

His achievements give a very good indication of the potential production possible from similar classes of country in Waimate County.

* * *

Results of topdressing. Above—A typical sward before topdressing. Below—Spectacular responses are usually obtained with the first topdressing.



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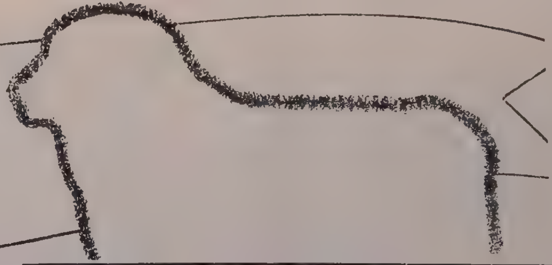

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Correct Use of

Artificial Lighting for Increased Winter Egg Production

THOUGH the artificial lighting of laying houses during winter has been practised and proved successful for many years, there are still certain aspects of this aid to increased winter production which are not fully appreciated by all commercial poultry producers. In this article F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, reviews some of the more important features of artificial lighting for poultry.

MOST commercial poultry producers in this country know that the subjecting of laying pullets to artificial lighting for increased winter egg production has been practised for many years. Since the days when oil-burning lamps were used for this purpose until the present-day use of electric lighting much has been learnt about the practice.

Though eggs are a normal and valuable part of human diet throughout the year, they must be termed to some extent an out-of-season food in winter. Supplies are lower in winter than in spring or summer and consequently prices are higher. There is therefore a direct incentive to poultry producers to obtain as many eggs as possible from their pullets during winter, and artificial lighting for birds is one of the most effective means of achieving this end. It is significant that commercial egg producers in other countries, such as the United Kingdom, consider artificial lighting essential in the successful and economical production of winter eggs. Consequently a proper knowledge of this practice is desirable.

Effect of Artificial Lighting

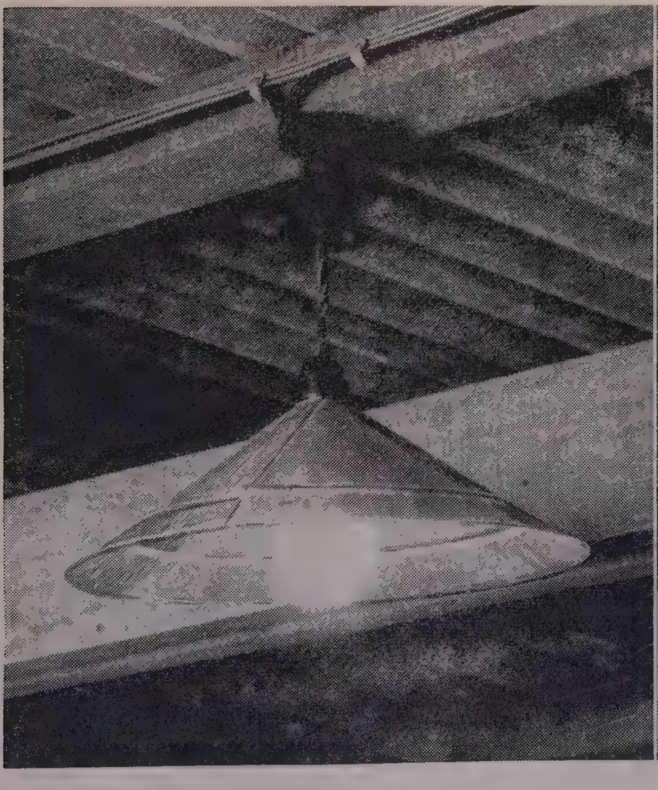
Primarily artificial lighting stimulates egg production at a time when it is not natural for pullets to lay heavily. However, producers should appreciate that artificial lighting has little effect on total annual production. Extra eggs laid during winter are at the expense of production during the remainder of the laying season.

Originally increased winter production was attributed to an artificial lengthening of the hours of light, thereby permitting and encouraging the birds to consume more food, which in turn stimulated higher egg production. It is now known that light stimulates the pituitary gland to produce a hormone which leads to a greater development of the ovary and consequently increased egg production. At the same time the extra hours of light allow the birds to eat more food to meet the demand of the increased production.

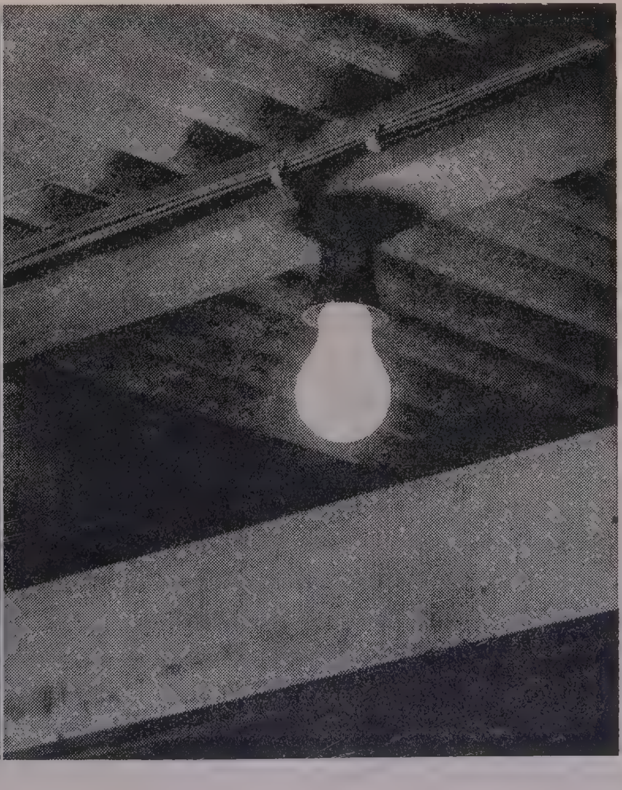
Systems of Lighting

Several systems of lighting have been tested and are used in commercial practice. Individual producers have a preference for one or another

▼ A 60-watt lamp and reflector on a short dropper to bring the lamp about 6ft. from the floor. This gives efficient use of this lamp with good intensity of light at floor level.



▼ A lamp fixed directly to the roof of a laying shed and more than 6ft. from the floor. This lamp has no reflector and consequently is not being used efficiently.



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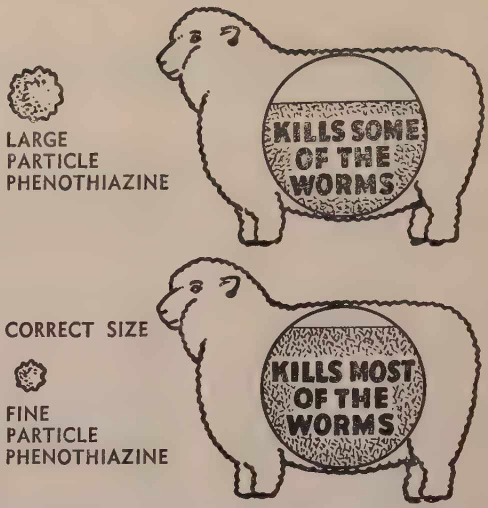
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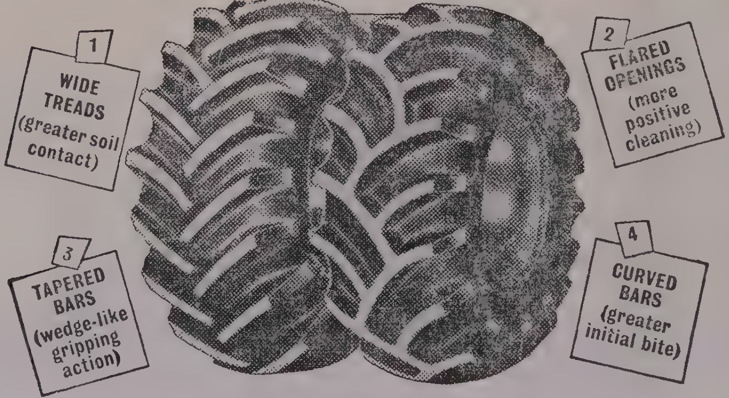
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of these systems, but there is little, if any, significant evidence to show that any one of these systems is better than the rest and will give a greater increase in production. Generally the basic objective where the more orthodox method of using 40- or 60-watt lamps is practised is to give pullets 12 to 14 hours of total light (natural and artificial combined) in every 24 hours.

The additional hours of light necessary to give the birds 12 to 14 hours of total light in a day may be achieved by (a) lighting in the evening, (b) lighting in the early morning, or (c) a combination of the two. Once evening lights are used and the birds come off the perches to feed the lights cannot be cut off suddenly.

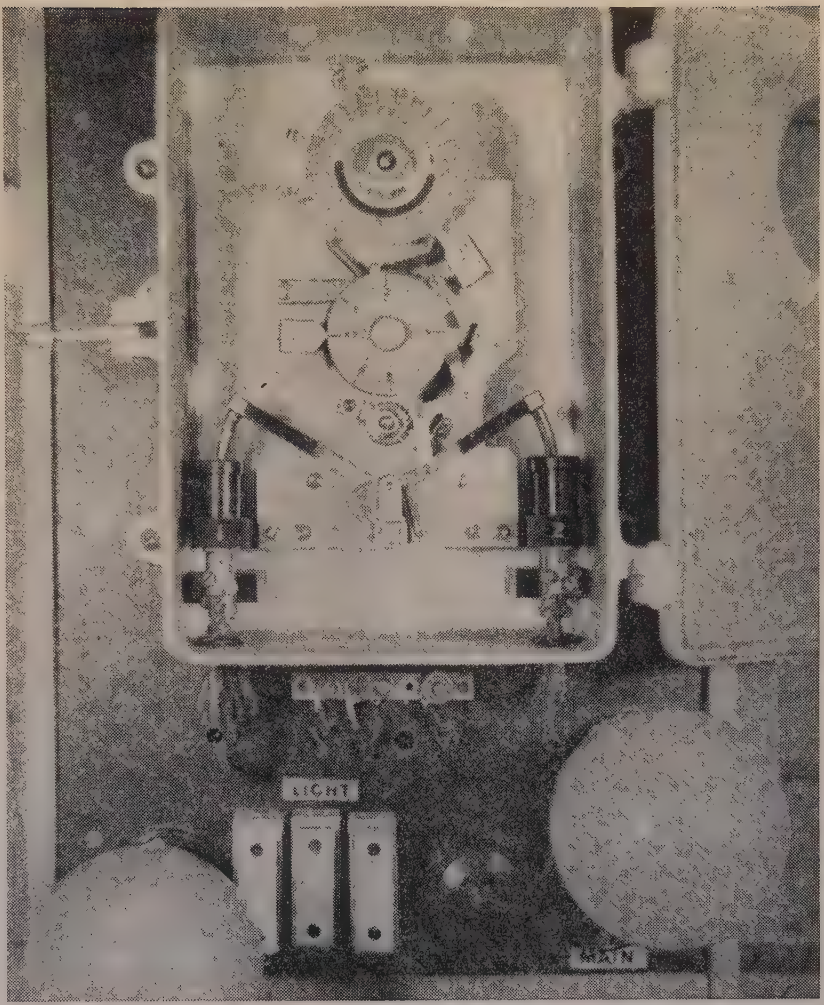
A special device must be used to dim the lights for a short period before they are cut off. This allows the birds to return to the perches before being plunged into darkness. Though this is quite a satisfactory system, a special dimming device must be added to the time switch which will control the putting on and cutting off of the electric current. In ordinary circumstances this is an expense which is not warranted unless better production than with morning lights results. This cannot be expected. The simpler system of early morning lighting is therefore recommended, as it entails only a time switch to put on and cut off the current.

For many years it has been customary to use 40-watt lamps and 4 to 5 hours of lighting according to the period of winter and the number of hours of daylight. However, investigations indicate that satisfactory results may be obtained by using 100-watt lamps and lighting for 1½ hours only. As the need for increased food consumption must be considered, pellets will be found an excellent form of food where the period of lighting is reduced in this manner. Pellets can be eaten more rapidly than dry mash and the birds' appetite satisfied more easily in the shorter period.

The question of whether fluorescent lighting should be used is sometimes raised. No better results appear to be obtained with this type of lighting and it is much more expensive to install.

Strength of Lighting

The intensity of light is important. A 100-watt lamp may be used for a far shorter time than a 40-watt lamp, though in both instances the birds must have sufficient time to eat the food they require. Satisfactory results have been obtained with 40-watt lamps, but another factor which must be considered is the distance of the lamps from the floor. The nearer the lamps are to the floor and thus to the birds the greater will be the intensity of light. Investigations and practice have shown that 40-watt lamps should be suspended approximately 6ft. from the floor. Some producers consider that 60-watt lamps are better than 40-watt lamps.



An orthodox type of time switch.

As the intention is to give a correct intensity of light at floor level, use of efficient reflectors behind the lamps is desirable. These may be constructed of a bright, high-reflecting metal and be wide angled, such as with a cone-shaped shade 12in. in diameter and approximately 4in. to 5in. deep. No purpose is served in lighting up the walls and the insides of roofs or in having the light shining directly on to the perches. It is essential that the light strike the food hoppers and water supply.

In this country the electric light bulbs are commonly placed high up in the roof, thereby dissipating much of the light and lessening the intensity of light at floor level. Where necessary all lamps should be dropped on pendants until approximately 6ft. from the floor. Many producers do not place the bulbs in reflector shades, and the result is loss in intensity of light where it is required. Poultry producers with these two faults in their system of lighting are recommended to rectify them.

Number of Lamps Required

The number of lamps required will vary according to the size of a laying shed, but one 40-watt or 60-watt lamp should be supplied for every 200 sq. ft. of floor space and lamps should be spaced 10ft. apart.

Switching Lights on and off

Time-switch clocks are available for putting lights on and off at whatever times are chosen. These are usually operated by clockwork and it is essential to see that they are wound up regularly. Another type, which has an electric clock, does not need winding. It also contains a spring which operates if there is a power cut and thus prevents the clock from stopping. This point is mentioned because the period of lighting must be regular each day.

A regular stimulation of the pituitary gland appears to be essential for continued increased or high egg production. If the lights fail or are used irregularly, the stimulus given to the gland becomes erratic, leading to a fluctuation of the hormone. **The result of this condition is a sudden fall in egg production.**

Thus to give the birds a reasonable period of lighting right from the start is not dangerous. It is often considered that lights should be brought on slowly, the period of lighting being increased to say 15 to 20 minutes each week until the 12 to 14 hours of total light is obtained. This is not entirely necessary. On the other hand cutting off the lighting suddenly can be disastrous. Thus toward the end of the lighting season as spring approaches the period of artificial lighting should be decreased slowly by, say, 15 to 20 minutes per week until there is 12 to 14 hours of ordinary daylight, thus making the addition of artificial lighting unnecessary.

Factors Affecting Period of Lighting

Careful consideration should be given to the number of hours of artificial lighting daily, and the period over which lighting is continued, in relation to the class of pullets concerned. If, for instance, the pullets are crossbred birds required solely for commercial egg production and not as breeding stock in their second year, it is permissible to give 14 hours of total light and to extend the period of lighting for as long as it is felt that egg production is held at a figure higher than for unlighted similar stock. Briefly, the birds are pushed hard for production.

If these pullets suffer from being forced for heavy production, this is not serious, as they will be disposed of for table purposes as soon as their production ceases to be economic. On the other hand purebred pullets required in their second season for breeding should not be forced in this manner. Twelve hours of lighting is sufficient, and as the longer days arrive in spring the lighting period should be eased gradually.

This advice applies particularly to pullets mated to produce crossbred pullet chicks. If the pullet dams are forced by over-stimulation with lights, the quality of their chicks is likely to be lowered appreciably.

Lighting for Breeding Hens

Some poultry producers see danger in artificial lighting for hens which are being used as breeding stock in spring. Provided the hens go into the breeding pen in good condition and total daily lighting (artificial and natural) is not in excess of 12 hours, there appears to be no evidence that artificial lighting is harmful.

Unquestionably lighting for hens when they are mated up in, say, May or June has a marked effect on the rate at which these birds come into production. Lighting gives the necessary stimulation to egg production just when it is most needed—as an aid to getting the eggs needed for the earlier hatches.

Lighting was used on both White Leghorn and Australorp breeding hens at the Poultry Demonstration Plant, Upper Hutt, last season with excellent results. There was no indication that it was detrimental to hatching or to the chicks produced.

Artificial lighting can be valuable for use with both pullets and hens, but like any other production method or operation should be used with common sense and should not be abused.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during June as follows:—

1XH Hamilton, 12.33 p.m.

11 June—"Feeding for Production", by O. V. Griffiths, Veterinarian, Department of Agriculture, Hamilton.

18 June—"Peat Land Problems", by J. R. Murray, Instructor in Agriculture, Department of Agriculture, Hamilton.

25 June—"Meat and Wool Matters", by A. W. Moore, Federated Farmers, Hamilton.

1YZ Rotorua, 7.15 p.m.

7 June—"Fertility in the Home Orchard", by Horticultural Instructor, Department of Agriculture, Tauranga.

21 June—"Diseases Met with during Meat Inspection", by C. N. C. Blair, Meat Inspector, Department of Agriculture, Rotorua.

2XA Wanganui, 8 p.m.

7 June—"For the Country Woman", by Mary Macdonald.

14 June—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

21 June—"Management of Chicks", by B. J. Russell, Poultry Instructor, Department of Agriculture, Wanganui.

28 June—"Efficient Dairy Farming", by G. R. Moss, Fields Instructor, Department of Agriculture, Wanganui.

2YZ Napier, 7.10 p.m.

5 June—"Feeding off of Supplementary Crops", by G. M. Bennett, Fields Instructor, Department of Agriculture, Hastings.

19 June—"Common Diseases of Livestock", by J. J. Byrne, Veterinarian, Department of Agriculture, Hastings.

3YA Christchurch, 12.20 p.m.

16 June—Review of "The New Zealand Journal of Agriculture", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

4YA Dunedin, 12.30 p.m.

5 June—"New Chemicals for Weed Control", by M. S. Foreman, Invermay Research Station, Mosgiel.

12 June—"Treatment of Fruit Trees", by W. S. Kemp, Horticultural Instructor, Department of Agriculture, Alexandra.

19 June—"The Department's Role in Soil Conservation", by G. G. Calder, Soil Conservator, Department of Agriculture, Dunedin.

26 June—"Machinery and Engineering on the Farm", by L. H. Weston, Machinery Officer, Department of Agriculture, Dunedin.

4YZ Invercargill, 7 p.m.

5 June—"Danish Farming", by C. D. Denize, Instructor in Agriculture, Department of Agriculture, Invercargill. "Trees on the Farm", by A. W. Grayburn, Forester, New Zealand Forest Service, Invercargill.

12 and 19 June—"Trees on the Farm", by A. W. Grayburn, Forester, New Zealand Forest Service, Invercargill. "Special Purpose Pastures", by W. Faithful, Instructor in Agriculture, Department of Agriculture, Invercargill.

26 June—"Hydatids", by G. A. Gray, Livestock Instructor, Department of Agriculture, Invercargill.

Regular Broadcasts

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8.5 p.m., Wednesdays at 8.1 p.m. (Northland stock market report), Fridays at 8.1 p.m.

1YA Auckland, Mondays, Tuesdays, Wednesdays, Thursdays, Fridays, 7.45 p.m., and Saturdays at 6 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

Remodelling Country Kitchens

WHERE'S Mum? The age-old question frequently has the same reply, so at most rural homes the path to the back door is the well-trodden one, and family and callers alike head for that happy domain, the farmhouse kitchen. It is here that the mother on the farm spends most of her working hours and where a cheery welcome and the comforting smells of cooking lend a homely and hospitable atmosphere. From the kitchen of the pioneering days to the present there has been a slow but steady transition and many of the older homes have been altered to suit prevailing conditions. The remodelling programme usually starts with the kitchen. The old work centre of the home is transformed, and though nothing is lost in atmosphere, a great deal is gained in labour saving and convenience. The methods used to alter the kitchens of three country homes which are all more than 50 years old are described in this article by Eirene E. Unwin, formerly Field Officer in Rural Sociology, Department of Agriculture, Christchurch, and Eleanor Couston, the present officer in that position.

EARLIER alterations were usually made in a rather haphazard way, perhaps by the addition of a lean-to scullery with plumbing to provide hot and cold water for the sink or by installing a refrigerator in an odd corner or in a shed outside. Though these facilities helped to some extent, many unnecessary steps still had to be made during the preparation of meals.

Today's ideas are based on both experience and experimental work, and remodelling starts with a carefully considered plan. A plan drawn to scale of the existing kitchen and surrounding areas will provide the best basis for working out the most economical and satisfactory arrangement. In some homes structural alterations will be necessary, but in others a rearrangement within the existing area may be sufficient. Large appliances such as refrigerators or stoves must also be measured and consideration given to placing them for the most efficient working sequence. A refrigerator or safe should be close to where food is prepared, the stove as near as possible to the dining area, and the sink conveniently placed to provide water for vegetable preparation, cooking, and washing dishes. Sufficient space for freedom of movement between benches and appliances is also necessary.

Points to Check

Before a plan is adopted the following points should be checked carefully:—

Size: Is the total area adequate to accommodate all appliances and can a table with room to sit comfortably be fitted in?

▼ The larder—a far cry from the well-planned storage cupboards of the remodelled Kitchen 1.

COUNTRY KITCHENS . . .

Bench space: Is there sufficient bench space for the preparation of food, for stacking and draining dishes, and for serving food?

Storage space: Will there be sufficient cupboards and drawers to hold all food supplies, cooking utensils, and china? Are these cupboards planned to avoid waste space?

Toe space: Has toe space been allowed under all work benches?

Working sequence: Have appliances, work benches, and storage space been arranged to save unnecessary steps?

Working heights: Are the benches, sink, and stove the most comfortable height for the worker?

Traffic lanes: Is the work area out of the direct line of people coming into the house?

Cooking, heating, and hot water supply: Are the facilities for these adequate for all requirements?

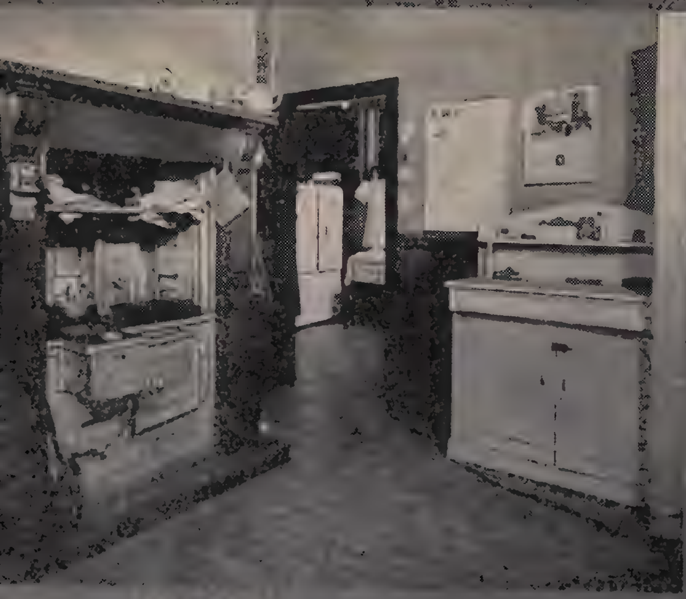
Ventilation and lighting: Will there be good circulation of air and good day and artificial lighting?

Future installations: Has provision been made for the installation of appliances, such as a dish-washing machine, which may be purchased in the future?

Kitchen 1

Kitchen 1 was typical of many of the older types of farm kitchens where equipment had been arranged with little thought for convenience. Space was limited in the main area,

Kitchen 1



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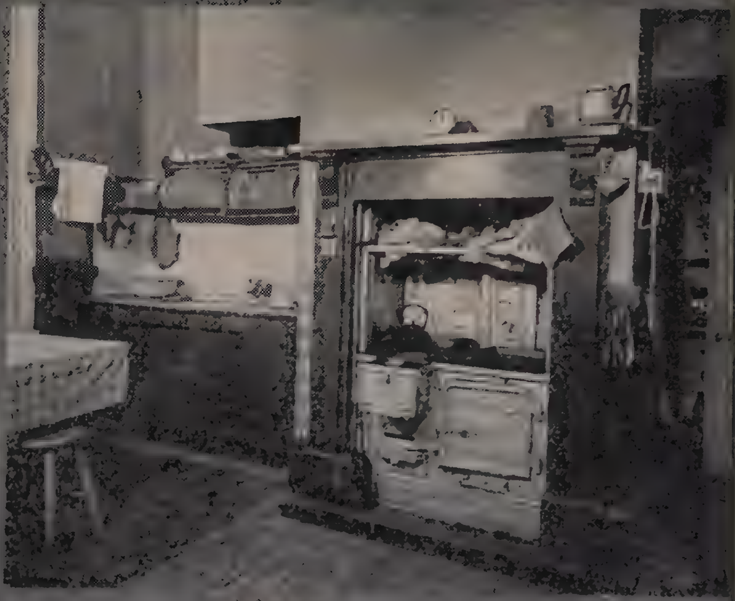

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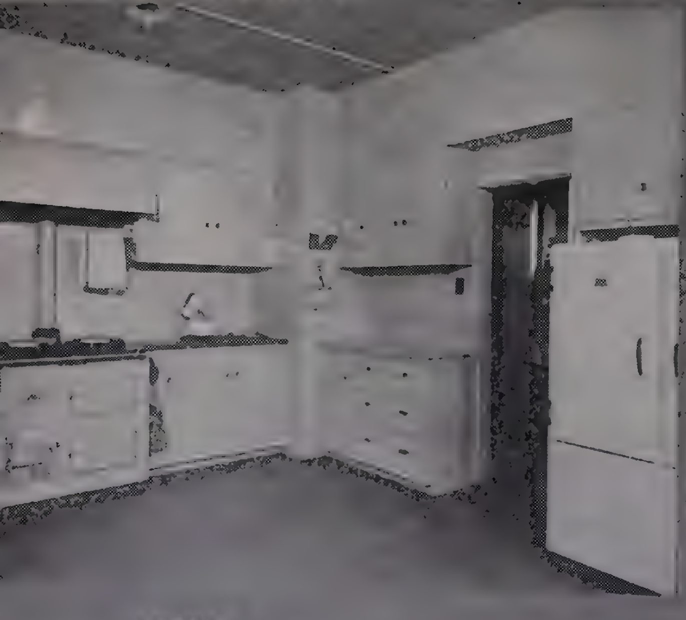

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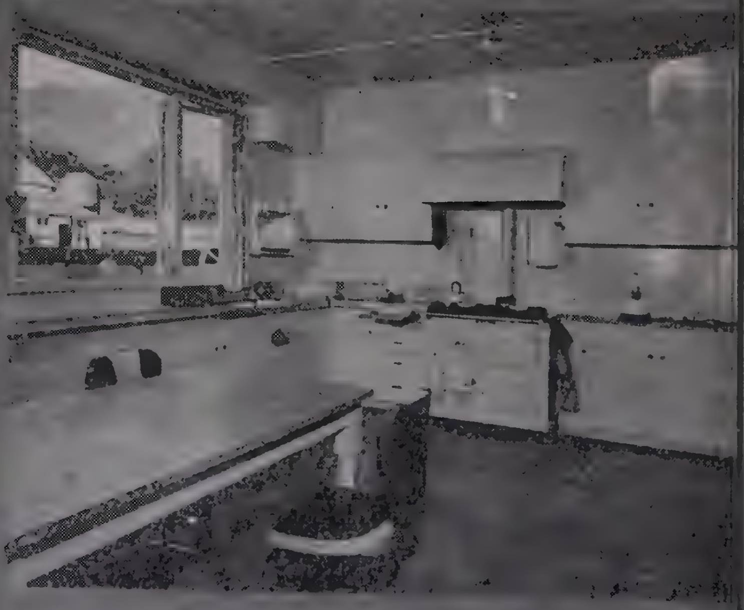


AFTER . . .

The coal range and the wall dividing the kitchen from the larder have been removed and the refrigerator, preparation bench, and heat-storage cooker make a compact work area.

The old sink with its inadequate bench space has been replaced by a stainless steel, double-bowl unit and the window enlarged to provide excellent light so new equipment, which included a large refrigerator and an electric stove, was placed in the only available space, in the area referred to as the back kitchen. Cooking supplies were kept in the larder.

The remodelling programme started with the removal of the wall dividing the kitchen from the larder and consequently the removal of the old coal range and the original sink. A heat-storage cooker was considered desirable to give continuous burning for cooking and to contribute sufficient warmth for comfort in winter. The electric stove was left in its original position to serve in an emergency. The dresser was removed and the refrigerator brought into the main area. Then the cupboards were planned to provide efficient storage for all the supplies previously stored in the larder as well as for china and ironing and sewing equipment.

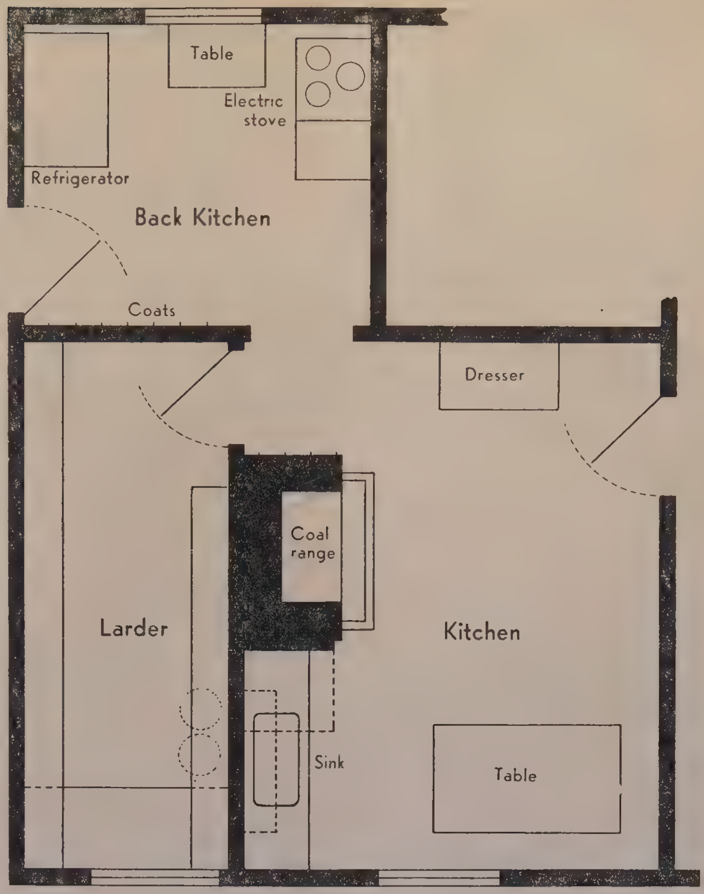
The ceiling of the original kitchen was considered too high, so a new ceiling 9ft. high was put in. Above-bench cupboards have a false top down to a height of 7ft. 2in. to avoid inaccessible areas (see lower left illustration on opposite page).

Adequate bench space was provided to cater for activities such as preparing and serving food and stacking and washing dishes. A double sink unit was installed, which, with the added facilities of a good hot water supply and a plate rack and drainer, means that dishes can now be washed, rinsed, and air dried. Tea towels are seldom used except for silver and cutlery.

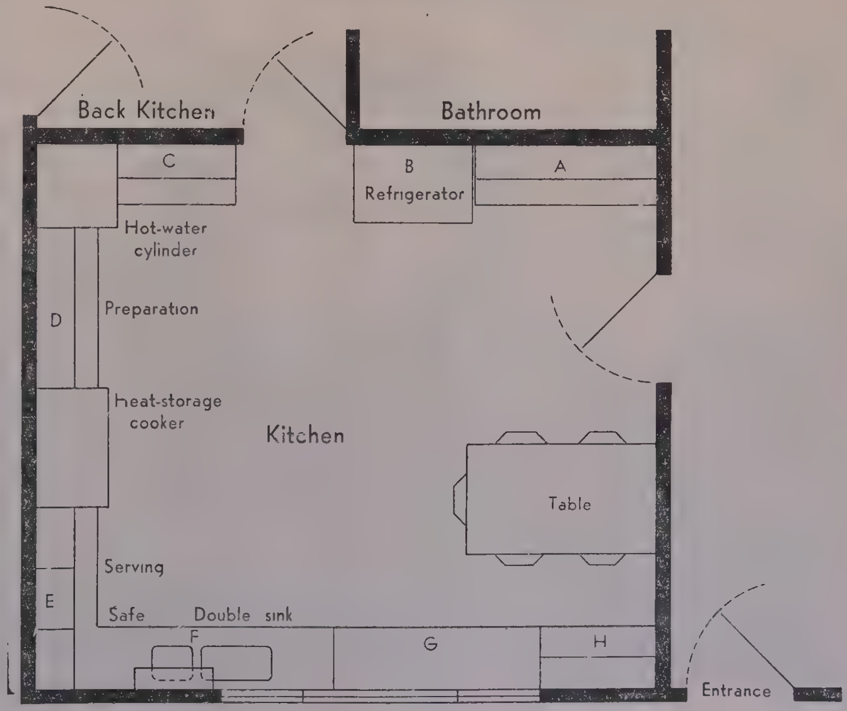
The window area was enlarged with the result that the kitchen is light and well ventilated and a lovely view is obtained of the farm buildings, the beautiful driveway of walnut trees, and a glimpse of the road and sea.

A comparison of the plans and photographs of the original area with those of the remodelled kitchen shows how the grouping of equipment and supplies has reduced the walking distance very considerably. The housewife can work unhindered by traffic from either entrance and there is

REMODELLING OF KITCHEN I

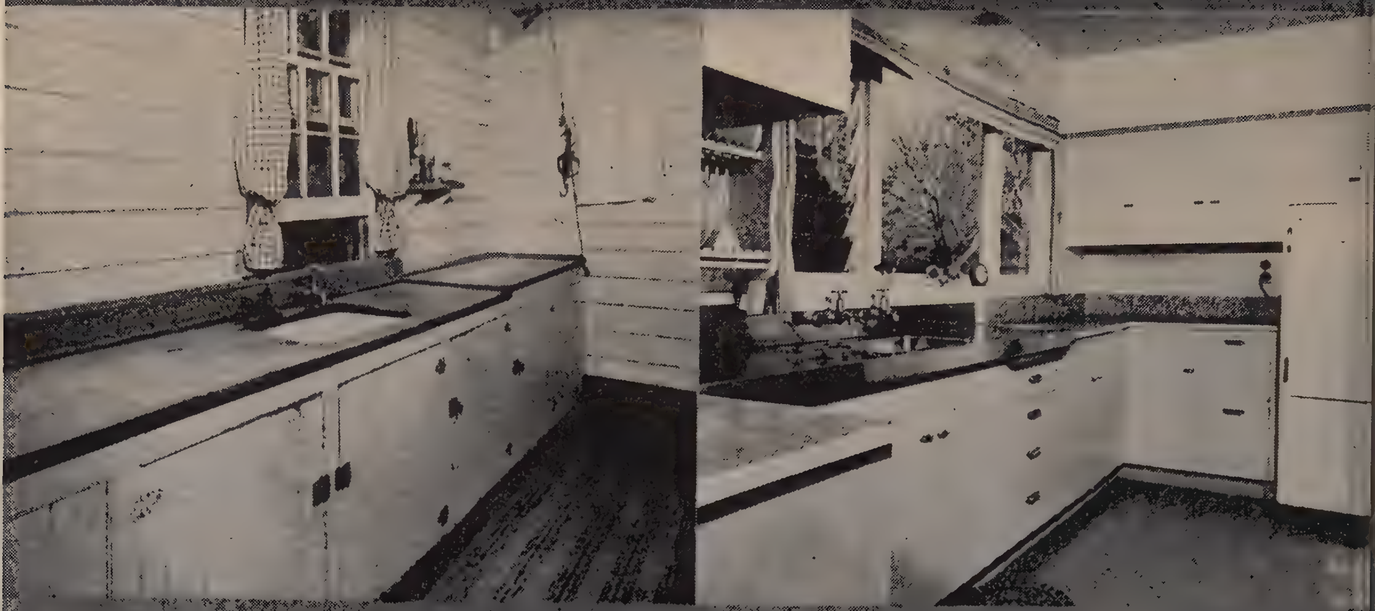


Kitchen I before remodelling.



Remodelled Kitchen I. A—Reserve → household cleaning supplies. Bread and cake tins. B—High cupboard over refrigerator used as a medicine cupboard. C—Above bench: Reserve food supplies, such as tinned foods. Below bench: Flour, sugar, and packaged cereals. D—Preparation unit. Above bench: Baking supplies on bench, electric mixer. Below bench: Mixing bowls, etc., tray cupboard. E—Safe for perishables. Bench space for serving. Below bench: Pull-out chopping board, drawers for tea towels, serviettes, etc., cupboard for baking tins and other cooking utensils. F—Sink unit. Above: Rack for draining dishes. Below—Storage for saucepans, container for soap, etc. G—Below bench: China. H—Above-bench cupboard: Good china. On bench: Radio and electric jug. Below bench: Ironing and sewing supplies.

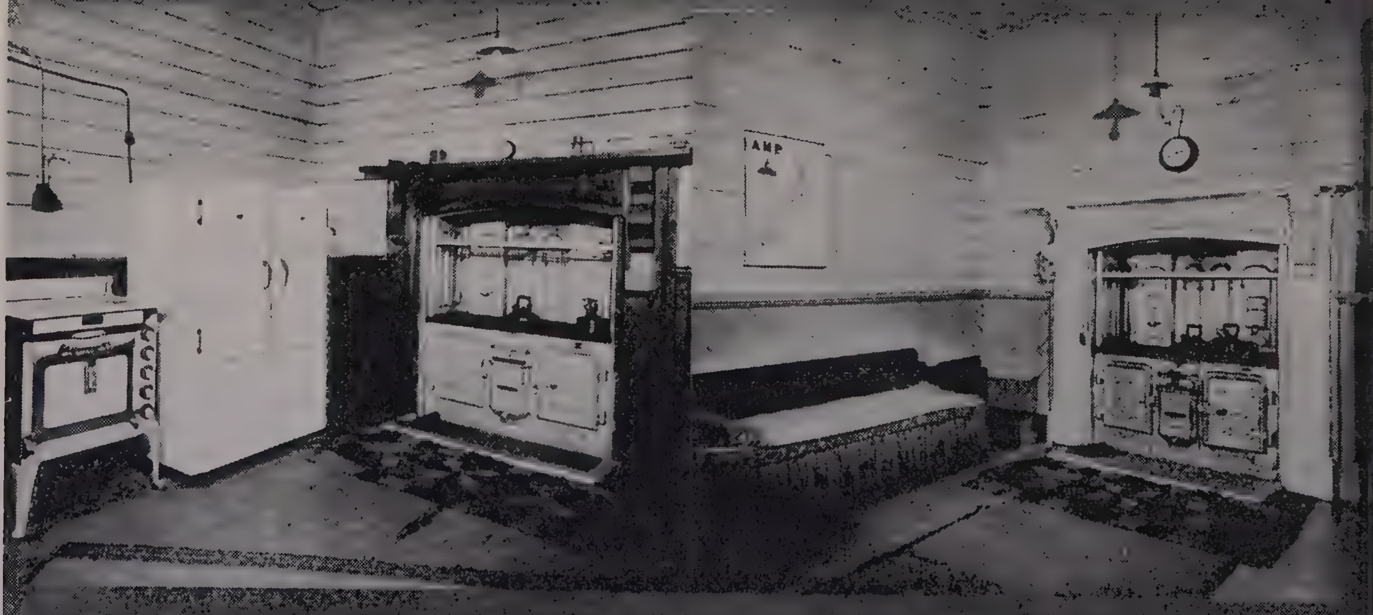
Kitchen 2



BEFORE . . .

The former scullery has been enlarged and is now a complete kitchen with everything needed for food preparation, cooking, and washing up.

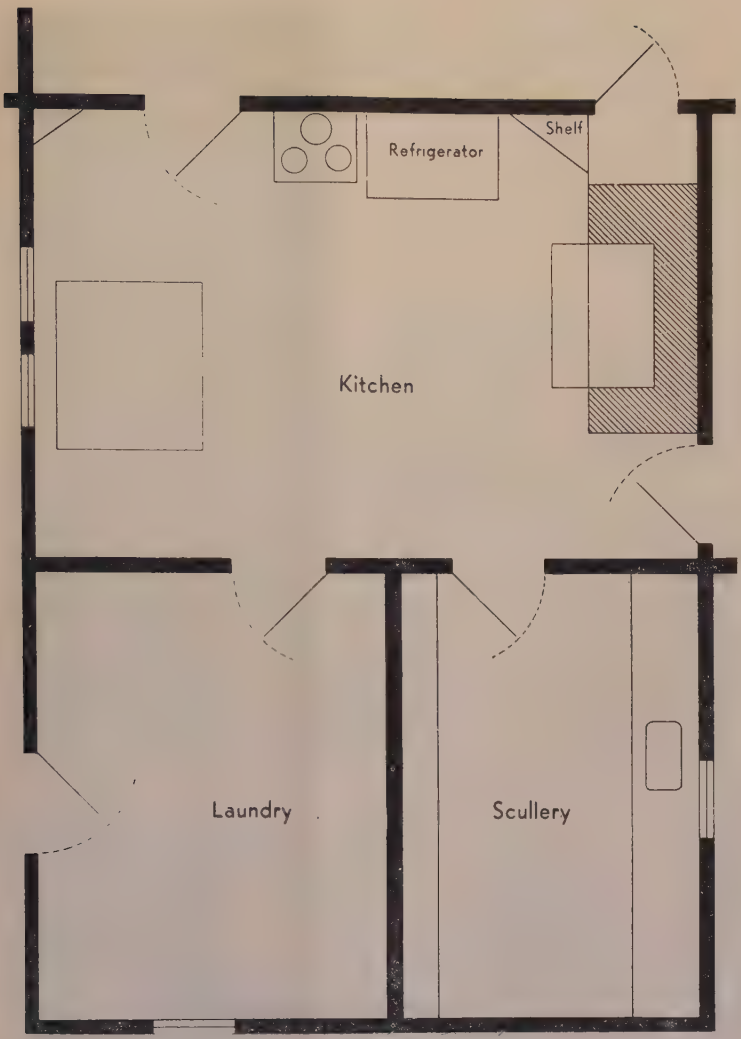
AFTER . . .



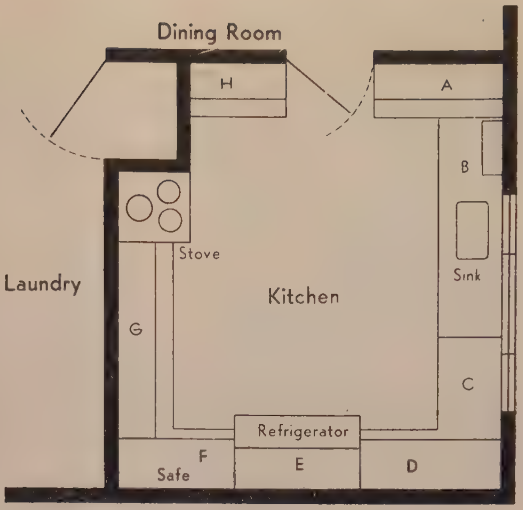
BEFORE . . .

The old kitchen has now become a dining-living room with space for the children to play.

AFTER . . .



Kitchen 2 before remodelling.



Remodelled Kitchen 2. A—China cupboard and tableware. B—Sink unit. Plate rack to left of sink. Below-bench cupboards for saucepans and cleaning supplies. Pull-out chopping board. Drawers for utensils and tea towels. C—Jams, preserves, etc., below bench. D—Above bench: Supplies for lunch making. Below bench: Drawers for bread and packaged cereals. E—Cupboards above refrigerator for tinned foods. Medicine cupboard. F—Large safe with bar and hooks for hanging meat and bacon. G—Preparation unit. Above bench: Cupboards for baking supplies. Below bench: Flour and sugar bins and cupboard for mixing bowls. Cupboard for trays. H—Cupboards above and below bench for china. The bench provides extra space for serving food.

adequate space for a large table for comfortable dining.

Kitchen 2

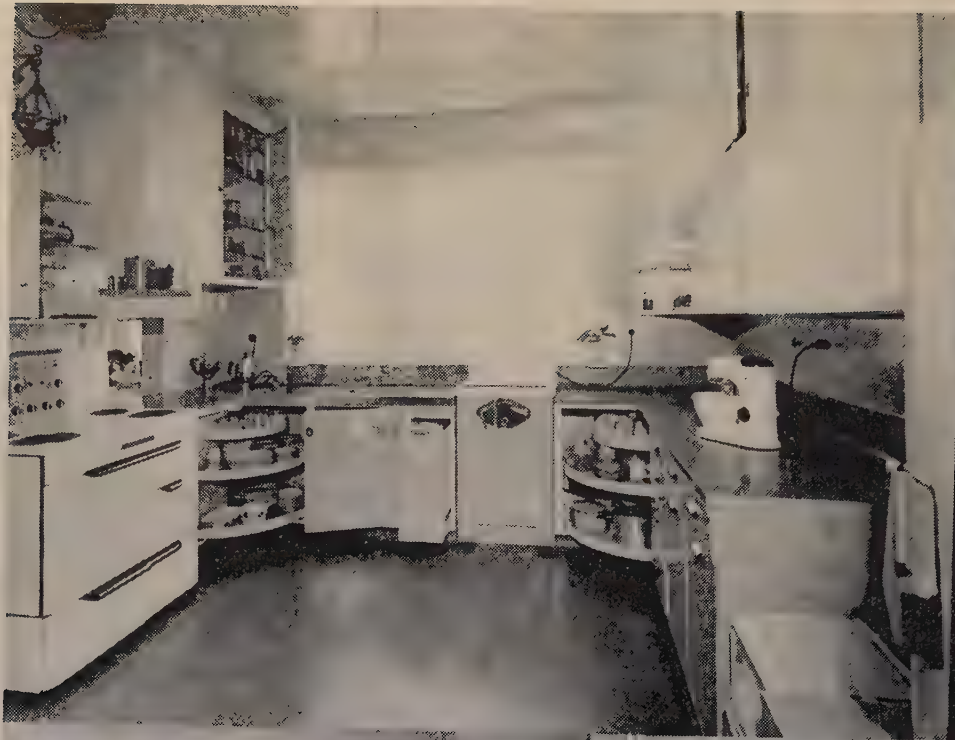
A different method was adopted in remodelling Kitchen 2. One important factor to be considered was that the family consists of father, mother, and 4 young children. The mother required an efficient work area and space nearby was needed for the activities of the children. The original plan shows the kitchen with dining table and coal range and newer equipment (electric stove and a refrigerator) added. Food preparation and washing up were done in the scullery.

After a scale plan was prepared the best way of improving conditions appeared to be to convert the scullery into a kitchen and to use the larger room as a dining room. This room could also be used for the children's activities without interfering with work in the kitchen. The coal range has been left in the meantime to provide warmth and for cooking if power cuts are enforced. The stove will be replaced later by a new coal range or a slow-combustion heater.

The scullery width was increased from 8ft. to 10ft. 9in. by moving the wall between the scullery and laundry. This additional width made the area adequate for the number to be fed. The window was enlarged with louvre windows placed on either side of a picture window for ventilation. A hood over the stove reduces steam and cooking odours. The equipment has been grouped to give good working sequence and the storage space has been carefully planned so that all supplies are stored as close as possible to where they are first used.

A safety measure which could well be followed is the storage of medical supplies in the cupboard above the refrigerator well out of reach of the small children. Another excellent feature is the provision of a large,

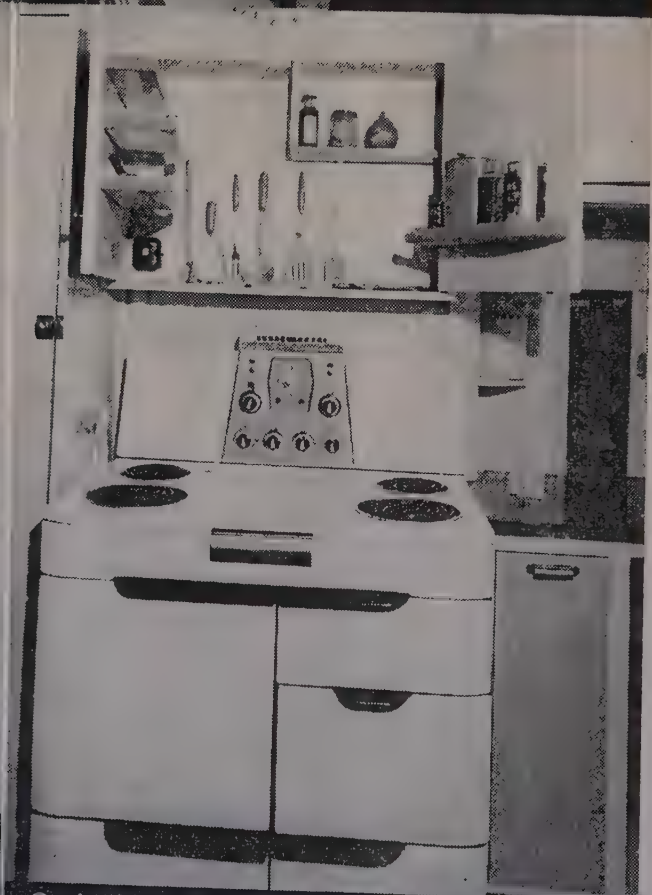
Refrigerator, safe, preparation unit, and stove are conveniently arranged.



Kitchen 3

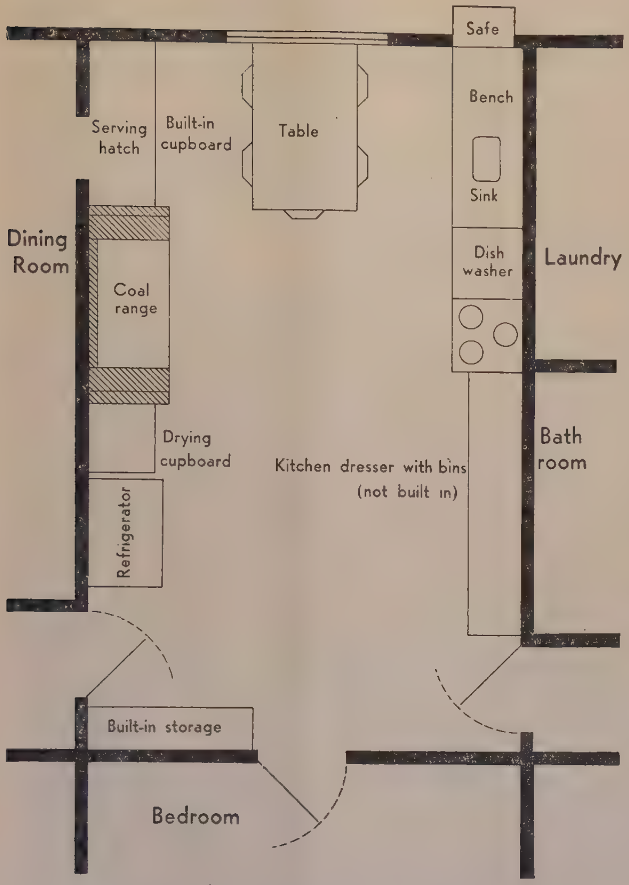
The work area of this kitchen shows a good working sequence. Waste space in corners is eliminated by the use of revolving cupboards.

The breakfast nook is close to the door and leaves the work area free.

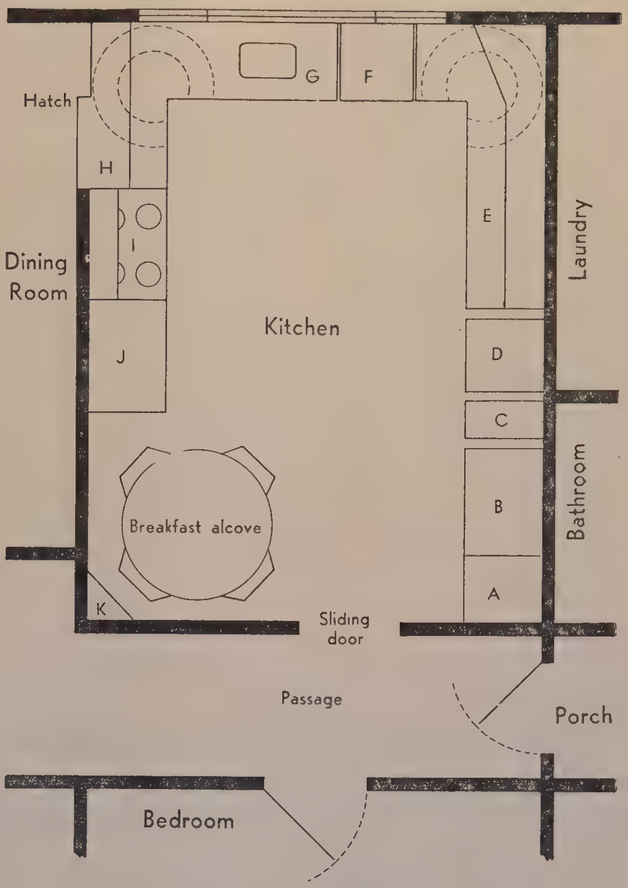


Cooking utensils, seasonings, tea, and coffee are stored within arm's reach of the stove.

[Green and Hahn



Kitchen 3 before remodelling.



Remodelled Kitchen 3. A—Cupboard for vases and extra china. B—Refrigerator. C—Container for coke hoppers. D—Slow-combustion heater. E—Preparation unit. Above bench: Cupboards for cooking supplies. Safe in corner. Point for electric mixer. Below bench: Drawers for cooking utensils, tea towels, packaged cereals, etc. Bins for flour and sugar. Revolving cupboard: Casseroles, saucepans, etc. F—Dish-washing machine. G—Sink unit. Above: Window. Below bench: Pull-out chopping board, drawers with vertical partitions for trays and baking board, cupboard for cleaning supplies. H—Serving unit: Cupboard above for china. Serving hatch to dining room. Point for electric jug and coffee maker. Below bench: Revolving cupboard for china. Cupboard with vertical partitions for cake tins. I—Stove unit. Electric fan in ceiling. Shallow cupboard above stove for tea, coffee, and condiments and serving utensils. J—Airing cupboard. K—Corner shelves for toaster, radio, etc.

cool safe with a rod and hooks for hanging meat and home-cured bacon.

Kitchen 3

Structural alterations to Kitchen 3 included the removal of the coal range, enlarging the window area, and putting in a partition to form a passage to the bathroom and the bedroom from the main part of the house. A slow-combustion wet-back heater was installed to provide warmth in winter and to supplement the hot water supply.

The window was enlarged and now gives excellent lighting. Fluorescent lighting is correctly placed for adequate lighting of work and dining areas by night. A desirable feature is the fly netting on the windows. An electric exhaust fan placed above the stove supplements the ventilation by the windows and removes all trace of cooking odours.

The working sequence resulting from good arrangement of equipment reduces to a minimum the steps necessary for all activities. An interesting comparison can be made by a study of the original plan.

Cupboard space has been designed to provide storage for supplies conveniently close to where they are first used. Articles frequently used are stored within arm's reach, and higher cupboards are used for preserves, jars, and equipment which is required only at odd times. Revolving cupboards in two corners make storage space available which would otherwise be inaccessible.

There is adequate bench space for food preparation, dish washing, cooking, and food service. The dining area is situated so that people can take their places without impeding the housewife during her preparations. To simplify the service of food to the dining room a sizeable sliding door food hatch has been installed close to the stove. Soiled dishes are returned through the hatch, scraped or rinsed, and placed in the dish-washing machine.

A delightful colour scheme, a pleasant view, and simple but effective decorative touches complete a scheme which combines beauty with efficiency.

Conclusions

The three renovations described show some of the possibilities which have become realities. No one will question that a good wife does much to ensure the prosperity of the farm and richly deserves amenities which will lighten her tasks. Good working conditions for her will be reflected not only in her own health but in the happiness and well-being of the entire family.

A Lady's Sports Jumper

SIXTEEN ounces of 4-ply wool are required for knitting this lady's useful sports jumper with a novel V-neck effect. Directions are given below for knitting a garment to fit a 35in. to 37in. bust.

ABBREVIATIONS: K. knit; p., purl; st., stitch(es); in., inches; beg., beginning; tog., together; rep., repeat.

Materials: 16oz. of 4-ply wool; 1 pair of No. 10 and 1 pair of No. 8 knitting needles. One 6in. slide fastener.

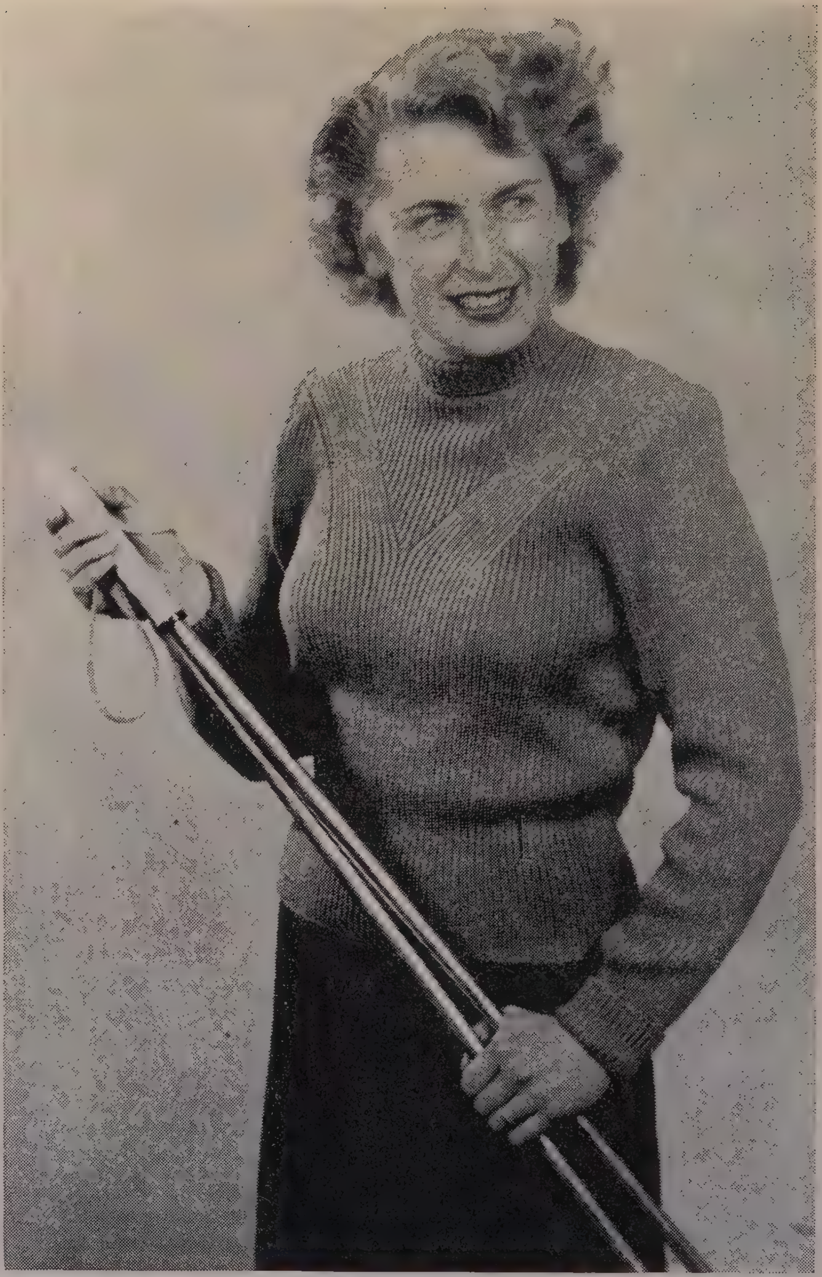
Pattern: Knit 1, purl 1 throughout.

Back

With No. 10 needles cast on 129 st. and work in rib of k. 1, p. 1 for 4½in. Change to No. 8 needles and continue in rib. Increase 1 st. at both ends of every 10th row 5 times. When work measures 13in. (139 st.) cast off for each armhole 5 st. at beg. of next 2 rows, 2 st. at beg. of next 4 rows, 1 st. at beg. of next 4 rows. After completing decreases for armhole, divide work into 2 parts for back opening. Cast off the centre st. so that an equal number of st. remain on each side. Work each side separately. Continue straight in rib until armhole measures 7½in. Cast off for shoulders 6 st. and work to end of row. Next row: Work to end. Next row: Cast off 6 st. and work to end of row. Next row: Work to end. Next row: Cast off 7 st. and work to end. Rep. last 2 rows 3 times. Next row: Cast off remaining 18 st.

Front

With No. 10 needles cast on 141 st. and work in rib for 4½in. Change to No. 8 needles and continue in rib. Increase 1 st. at both ends of every 6th row 8 times. When work measures 13in. (157 st.) cast off for each armhole 9 st. at beg. of next 2 rows, 3 st. at beg. of next 4 rows, 2 st. at beg. of next 2 rows, 1 st. at beg. of next 6 rows.



At same time as beginning armhole, begin pattern at front. First mark the centre st. with a thread of contrasting wool. Now work in rib to 23 st. from centre st., k. 2 tog., work 21 st. in rib of k. 1, p. 1, make 1 by picking up and knitting into back of loop of previous row, work 21 st. in rib, slip 1, k. 1, pass slipped st. over, work in rib to end of row. Repeat these increases and decreases in every right side row. Keep 21 st. in each panel. Work 1 st. less at left and right sides and 2 st. more in the centre each time. When armhole measures 6in. cast off for neck: First the 15 centre st.; then cast off at each side of neck. Cast off 5 st. Next row: Rib. Next row: Cast off 3 st. Next row: Rib. Next row: Cast off 2 st. Next row: Rib. Next row: Cast off 1 st. Next row: Rib. Next row: Cast off 1 st. Next row: Rib.

When armhole measures 8in. cast off for shoulder: Cast off 6 st. Work to end of row. Next row rib. Rep. these 2 rows twice. Cast off 7 st. Work to end of row. Rep. this once. Cast off remaining 7 st.

Sleeves

With No. 10 needles cast on 127 st. and work in rib for 4in. Change to No. 8 needles and continue in rib. When sleeve measures 19in. cast off for top at both sides of work 4 st. at beg. of next 2 rows, 3 st. at beg. of next 2 rows, 2 st. at beg. of next 2 rows. Then decrease 1 st. at both sides 23 times; then at both sides cast off 2 st. at beg. of next 6 rows. Cast off 3 st. at beg. of next 4 rows. Cast off 4 st. at beg. of next 4 rows. Cast off remaining st.

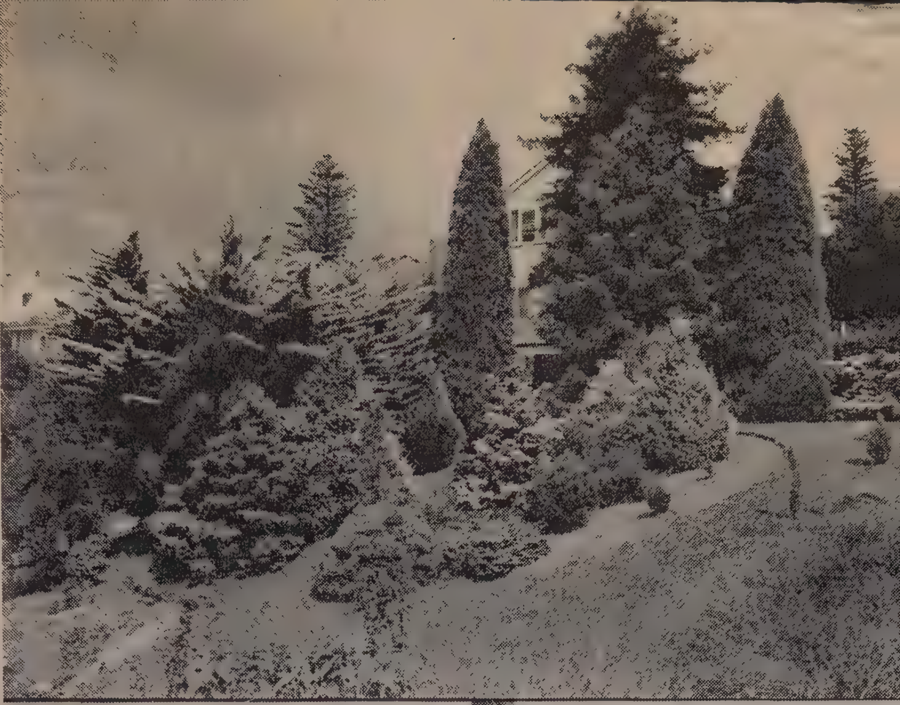
To Make up

Press all parts lightly on wrong side. Sew jumper together. With No. 10 needles pick up about 95 st. around neck opening and work in rib of k. 1, p. 1 for 3in. Cast off loosely in rib. Fold collar over on to right side. Work one row of single crochet along both sides of back opening and sew in slide fastener. Sew shoulder pads in position.

Ornamental Conifers

PROBABLY no other group of trees shows such a wide variation in size, form, and colour as conifers. Many have great ornamental value and can be used in numerous ways in the garden. In this article J. S. Say, Horticulturist, Department of Agriculture, Auckland, describes some of the better varieties and forms and gives suggestions for their use and culture. Notes for garden work for June are by K. H. Marcussen, Horticulturist, Department of Agriculture, Christchurch.

CONIFERS are found in practically all regions of the world, from the Arctic to the tropics. In the temperate zones they grow under a wide range of conditions, from the sea coast to inland plains, in swamps, and in the harsh conditions of high mountain ranges.



A magnificent group of conifers in → an Auckland garden where advantage has been taken of the sloping site to display differences in height, growth habit, colour, and texture. A Californian redwood is in the centre background with a deodar immediately in front. To the sides of this are two upright forms of *Cupressus torulosa*. On the left is *C. macrocarpa lambertiana* with spreading branches and golden foliage, and on the extreme right and in the centre are specimens of *Chamaecyparis obtusa crippsi aurea*. Also in the group are varieties of *Chamaecyparis lawsoniana* with blue, yellow, and golden foliage, *Chamaecyparis pisifera squarosa* (bluish grey), and cryptomerias, thujas, and junipers in shades of green. Sparrow photograph.

It is not surprising that in such an extensive family growing under such diverse conditions great variations in size and growth habit have developed. The smallest-known conifer in the world, *Dacrydium laxifolium*, is found above the 2500ft. level in many mountain ranges in New Zealand and often reaches maturity and bears seeds when only 3in. high. Ultimately it may, under some conditions, reach 2ft., but it is still a dwarf when compared with the kauri, which may attain 80ft. to 100ft. The kauri is dwarfed by the 300ft. sequoias of California.

Specimens of *Chamaecyparis obtusa nana aurea* are a striking feature of this garden and are in complete harmony with the walls and drive. Sparrow photograph. →

Shape and form are also very diverse, ranging from the thin spires of good types of the Italian cypress (*Cupressus sempervirens stricta*) to the prostrate *Juniperus horizontalis*, which forms a thick mat a few inches high and many yards in circumference. Between these two extremes are many species with conical, pyramidal, spreading, and globular forms.

Leaf colour and texture alone make many conifers well worth growing. Colours range from grey, blue-grey, blue-green through many lighter shades of green to yellow-green, gold, and bronze. In addition there are many forms with yellow and gold tips to the branchlets and others have flecks and splashes of paler colours through them. The gold, yellow, and bronze forms are particularly good in cold climates and are excellent for brightening gardens of southern parts of New Zealand in winter.

When a garden is being planted the texture of plants is not often thought of, but it is such an important feature of conifers that it should be considered along with size, shape, and colour. Texture may vary from the dense but feathery appearance of *Chamaecyparis pisifera plumosa* to the sombre and solid mass of the yews (*Taxus* spp.), or from the light, shining appearance of a young rimu (*Dacrydium cupressinum*) to the hard, gaunt effect of an old pine.

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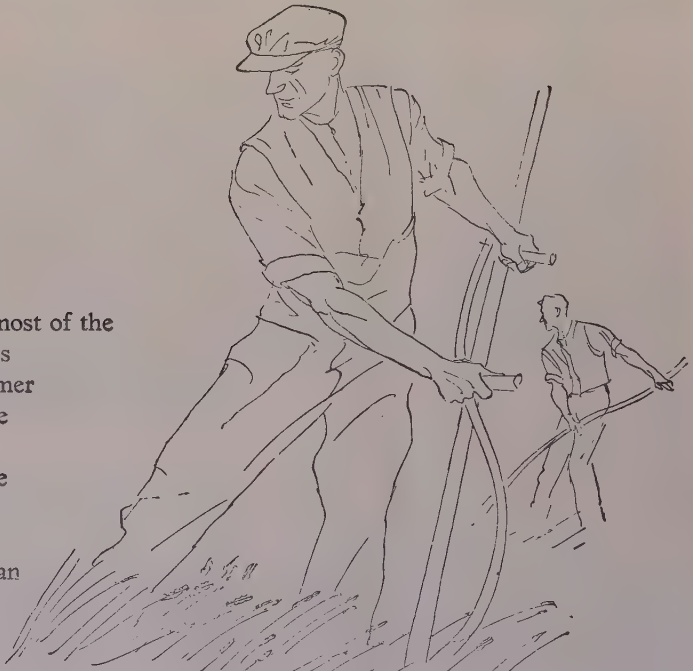

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Uses in the Garden

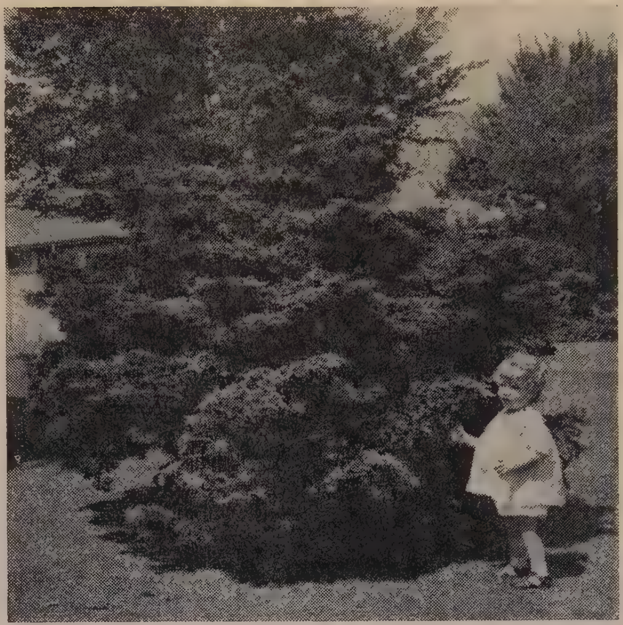
With a group of plants such as this with so many individual characteristics it is easy to see that the uses to which they can be put are numerous. They can be used as specimen trees or in groups or they can be used to give interest and colour to shrub borders which often look bare during winter. As accent plants in a mixed flower border they are not out of place if careful thought is given to their choice and placement. A rock garden is the perfect setting for many of the smaller species, and some of the spreading, prostrate forms make excellent ground cover for banks. They are good as tub plants and some of the dwarf forms and young plants of the coloured varieties make striking and unusual house plants.

Specimen Trees

Mutilated pines and macrocarpas and topped Norfolk Island pines and cedars which can be seen in almost any town are mute reminders that unless thought is given at planting time many trees soon outgrow their positions. Some of the larger conifers make perfect specimen trees, but should be planted only where they have room to develop. As there is rarely sufficient space in the average town garden where there are often the added complications of numerous overhead wires and the effect of neighbouring properties, larger conifers should be planted only in the country. Here they can often be planted outside the garden proper and yet form an integral part of the design.

Rimus and kawakas (*Libocedrus plumosa*) are probably the most beautiful of the native conifers. The rimu is pyramidal when young and later becomes a round-topped tree up to 60ft. to 80ft. high, and the kawaka is a narrow, tapering tree up to 50ft. with pale green foliage.

Among the introduced conifers *Cedrus atlantica glauca*, *C. deodara aurea*, and *Picea pungens kosteriana* make outstanding specimen trees because of their colour and graceful symmetrical habit. Their mature height is up to 40ft. with a spread of about 20ft.



[*Sparrow*

A very old tree of *Chamaecyparis obtusa nana* showing characteristic growth habit of this species.

C. atlantica glauca is an erect tree with spreading, horizontal branches with blue-grey leaves.

[*Sparrow*

Conifers in a small home garden. The golden yellow *Chamaecyparis lawsoniana aurea* is on the right with *C. lawsoniana minima aurea* in front.

C. deodara aurea is the golden form of the well-known deodar with slightly pendant branches.

P. pungens kosteriana has grey foliage which assumes a particularly intense colour in spring. It does very well in the colder parts of New Zealand.

Trees such as these which have character and refinement could well be used in place of monkey puzzles (*Araucaria imbricata*) and poor forms of Italian cypress which are planted indiscriminately in so many gardens.

A little-known tree suitable for farm planting in swampy or very moist positions is the swamp cypress (*Taxodium distichum*), one of the few deciduous conifers. The leaves are a soft, pale green in spring, yellowish green in summer, and a brilliant golden bronze in autumn. Its mature height is up to 100ft., but it is a tree which could be used more where conditions are suitable.

The golden larch (*Pseudolarix fortunei*, *P. amabilis*) is another deciduous conifer which will stand moist conditions, but must have good drainage. The leaves turn a rich golden in autumn. It is very hardy, rather slow growing, and reaches a height of 50ft. to 60ft.

Ginkgo biloba, the maidenhair tree, is a well-known member of this botanic group, though it bears little resemblance to the popular conception of a conifer. The leaves turn a bright

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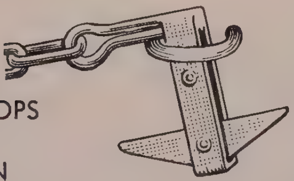

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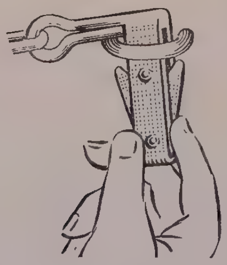

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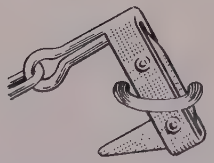

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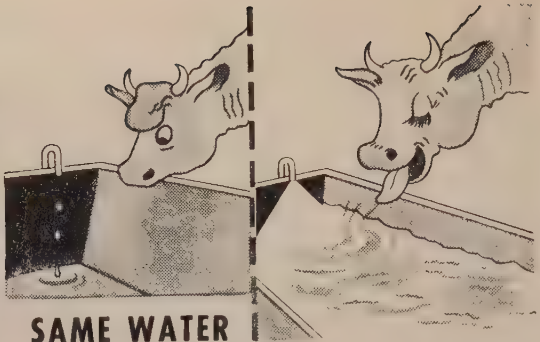

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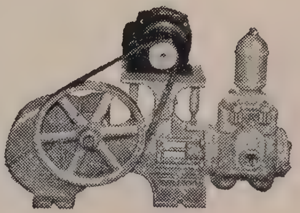

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golden yellow in autumn and it is one of the few trees which colour well in the warmer parts of the country. It is another tree which should not be planted in small town gardens unless there is sufficient room for it to develop. Its mature height is 40ft. to 50ft. with a spread of 20ft. or more.

Some smaller conifers suitable for specimen planting on restricted areas are *Chamaecyparis lawsoniana* Triomphe de Boskoop (20ft.), a bluish form of the well-known Lawson's cypress; *C. lawsoniana lutea*, *C. lawsoniana stewarti*, and many other Lawson's cypress varieties with blue, gold, and yellow foliage; and *C. obtusa crippsi aurea* (15ft.), with golden foliage and the branchlets in dense flattened sprays. Some of the Lawson's cypress varieties are very susceptible to cypress canker and where this disease is prevalent it is advisable to keep a close watch for it. Cypress canker is described later.

Group Planting

Because of the great variation in shape, colour, and texture conifers lend themselves to group planting. Groups may be large or small according to the space available and the size of the tree should be in proportion to the size of the group.

Contrast in shape can be obtained by using tall, upright, and pyramidal forms at the back with shorter, upright, and globular forms in the centre, and dwarf and prostrate forms in the front. When this contrast in sizes and shapes is accentuated by contrasts in colour and texture many striking and interesting effects can be obtained. Groups such as these can be used in a corner of the section, to screen off one portion of the garden from another, or at the base of a house with high foundations.

In such planting care should be taken to allow the plants sufficient room to develop so that they do not touch until almost full grown. If they are crowded, they grow into one another and lose their individual characteristics and also tend to die out in the parts which are touching.

Many farm homesteads are protected by high shelter hedges of pines, macrocarpas, and Lawson's cypress. A great deal could be done to brighten the outlook by planting groups or specimen trees of some of the ornamental conifers in front to give a little variation and a touch of colour. Where new shelter belts are to be planted a more or less informal belt of mixed conifers is worth considering.

Shrub Borders

Shrub borders without a solid foundation of evergreens often look thin and sparse during winter, especially in the colder parts of New Zealand. Generous use of conifers can do much to overcome this fault. Practically all the lower-growing *C. lawsoniana* varieties, *C. obtusa* varieties, and *Thuja occidentalis* varieties are suitable. These can be obtained in a wide variety of growth habits and colours.

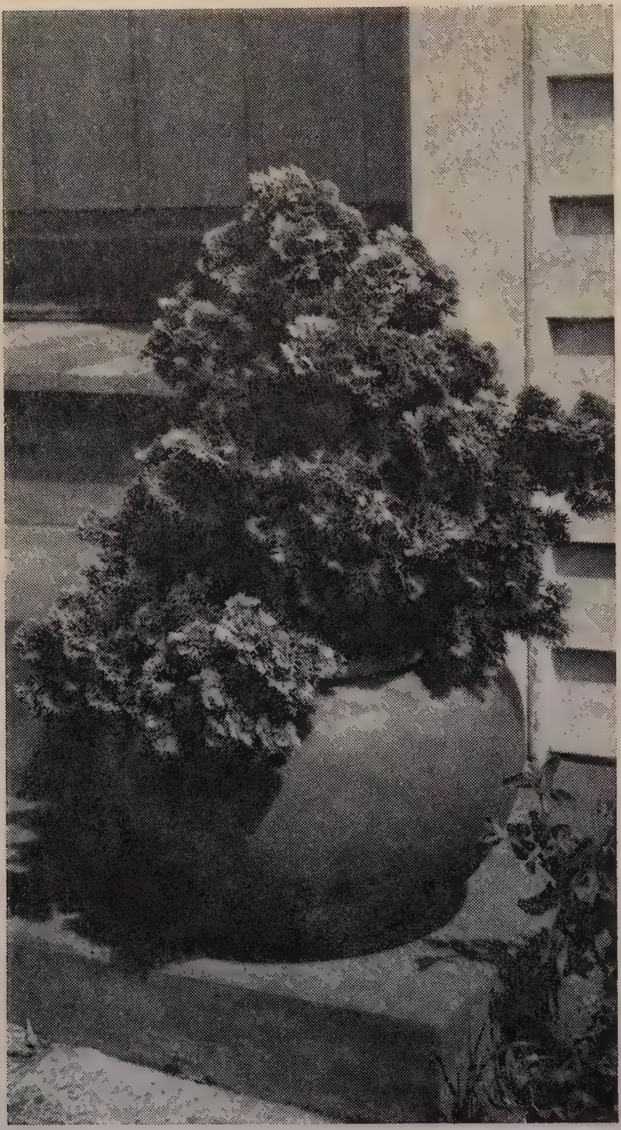
Rock Gardens

Some of the smaller conifers are ideal for the rock garden, either as a feature of the garden itself or as a background to screen off buildings or other parts of the garden. Many of the dwarf types which form compact bushes sometimes only 12in. to 18in. high can be used in pockets, and some with prostrate growth are useful for covering larger areas. Varieties with an irregular, rugged type of growth look particularly at home among the rocks and can be depended on to give colour in the coldest weather.

A striking contrast which may be used as a focal point can be had by planting one of the smooth, columnar types of dwarf to medium height where it can be seen against the rough mass of a rocky outcrop. This type can also be used on the crest of the rock garden to give the impression of height.

Many of the choicer conifers suitable for rock garden planting are not readily available and they may not be cheap but are well worth the trouble of finding, for they have a type of beauty that can maintain interest throughout

Cedrus deodara and *C. atlantica* are among the best conifers for specimen planting, but are too large for the small town garden.



[*Sparrow*

Dwarf conifers make ideal pot and tub plants which can be kept in perfect condition for many years. *Chamaecyparis obtusa nana* growing in an unglazed earthenware bowl.

the seasons. Some of the more interesting species and varieties are:—

C. lawsoniana minima, compact, dark green, and almost globular. Its height is about 2ft., though it may grow larger after many years. Blue and golden forms can also be obtained sometimes.

C. filifera aurea is an excellent golden form with fine, thread-like foliage.

Juniperus communis compressa forms a dense, dark green column and can be regarded as a very large plant when 2ft. high.

C. obtusa nana aurea is a slow-growing dwarf conifer with golden foliage and a very attractive growth habit.

Banks

Unsightly banks are a problem in many gardens. Provided they are not too steep, low, prostrate shrubs can often be used to cover and stabilise them. Among the conifers particularly suitable for this purpose are some of the prostrate junipers.

J. horizontalis and its varieties, *J. procumbens*, and the prostrate forms of *J. chinensis* and *J. sabina* are suitable.

Tubs and Urns

In many modern gardens where emphasis is laid on design and texture of the building material rather than on living plants, trees or shrubs growing in containers can be very useful. A well-grown plant in a tub or urn of simple design placed against a wall or on a terrace can give a touch of colour, life, and movement. Large unbroken expanses of wall or paving can become monotonous and uninteresting in time.

Most conifers, even large species, can be grown well in tubs provided they are not neglected. Watering in summer is most important, for they will not stand dry conditions and on the other hand they should not become waterlogged in winter. A little blood and bone worked into the surface occasionally helps them considerably.

Among the large trees which will make excellent tub plants are rimus, kawakas, kauris, cedars, yews, abies, and piceas. The last two make very good Christmas trees which will last for many years. Practically all the dwarf conifers are suitable for smaller tubs and urns.

House Plants

Many of the very dwarf forms of conifers with their quaint shapes and growth habits are very useful as house plants, for they will stand indoor conditions well. Growth is slow and with care they can be kept in good condition for many years. When flowers are scarce in winter they can be brought inside and then returned to the open for the rest of the year. Young plants of taller-growing species can also be used in the same way and after serving as a pot plant for one or two winters can be planted out in a permanent position in the garden.

The pigmy forms are **naturally** dwarf types of larger trees. These should not be confused with the miniature types (**artificially** dwarfed large trees) the training of which has been perfected by the Japanese. These require many years of patient training and attention before they assume their characteristic appearance. As a rule pigmy trees are not cheap to buy, as they are slow growing and take many years to reach a saleable size, but a well-grown specimen will give an immediate effect. Most of the smaller rock garden conifers are suitable for this purpose.

Soil and Planting

Generally, ornamental conifers like a deep, well-drained soil that will not dry out in summer. Most of the species available in New Zealand are hardy and will stand cold. As a group they are not very resistant to salt winds and even away from the coast it is better if they can be given a position that is not too exposed to strong winds.

Before planting, the soil should be deeply and thoroughly dug, for though conifers will stand considerable ill usage, they respond to good treatment like any other ornamental tree. On light, sandy soils which tend to dry out in summer or clays which are poorly drained in winter and bake hard in summer it is advisable to work in well-decayed compost some months before planting. When planting, a little blood and bone can be worked into the soil.

Planting can take place from late autumn to early spring. Late winter or early spring planting is better in cold, frosty districts or where the soil is excessively wet. Some nurserymen are now growing trees in tins or other containers and these can be planted at any time. If trees are root-bound, some of the roots should be teased out gently before planting.

Maintenance

Once established, conifers require very little attention. Watering may be necessary during hot, dry summers, especially during the first year or two after planting. Extra care will be necessary for container-grown plants if they are set out in the hot, dry part of the year. A little blood and bone should be worked into the soil in spring and where possible a light mulch should be given to conserve moisture in summer.

Pruning

Most conifers need very little pruning. It should be limited to the removal of shoots which are likely to spoil the natural shape or symmetry of the tree; for example, double leaders should be removed from those species which form pyramids. It must be remembered that many conifers, especially some of the dwarf types, have a very irregular habit of growth. If these are pruned, their natural shape is spoilt and their individual character is lost.

With one or two exceptions conifers will not produce new shoots from bare wood, for unlike most other trees they do not have dormant buds in the stems. It is therefore essential that all pruning should be done to a vigorous young shoot or to a branch. It should be limited to leafy young branches and can often be done by cutting out unwanted shoots with secateurs at an early stage of their growth. The use of a saw denotes that pruning has not been done at the correct stage of growth. Hedge shears should never be used.

Upright cypresses should be confined to a single leader and the side branches cut with secateurs to an inward or upward facing shoot. In this way they can be kept to a slender column and it will not be necessary to bind them with wire into the unsightly bundles that disfigure so many gardens. When these trees are bought bushy types of plants with several leaders should be avoided, as these are not good forms of the true Italian cypress.

Conifers produce a flush of growth in spring and autumn, but do not grow much during summer. Where only light pruning is needed it should be done late when the new growth is nearly finished. The foliage will then grow sufficiently to close over the small cuts. Where extensive pruning has to be carried out on neglected trees it should be done before the flush of growth starts so that there is a chance of the new growth covering any gaps.

Pests and Diseases

The pests of conifers are generally of little importance in New Zealand and are unlikely to cause any serious trouble in the home garden. Caterpillars are sometimes a nuisance, but they can be controlled by spraying with DDT or arsenate of lead.

There is only one serious disease, cypress canker (*Monochaetia unicornis*), which is particularly severe on *Chamaecyparis lawsoniana* and *Cupressus macrocarpa* and their varieties. Usually the first indication that a tree is suffering from this disease is when small twigs or branches die. A smaller canker, often exuding gum, will frequently be found near the base of the dead portion. As the disease progresses larger limbs become affected and the tree dies. As soon as any dead twigs are noticed they should be cut out well below the canker. A bordeaux spray applied at intervals during winter will give some measure of control.. An article on this disease appeared in the March 1954 issue of the "Journal".

A condition known as "wet feet" is often confused with cypress canker. This trouble usually affects the tree as a whole and isolated twigs or branches do not die first. The cause of death in this case is waterlogged conditions at the roots due to inadequate drainage. Severe drought will also cause trees to die for no obvious reason. Death through this cause often occurs fairly suddenly weeks or sometimes months after the dry period. Special care should be taken of conifers in tubs and pots during dry weather.

Further Reading

For further reading on this subject the following publications are recommended:—

W. Dallimore and A. B. Jackson, "A Handbook of Coniferae", Edward Arnold, London, 1948.

A. B. Jackson, "The Identification of Conifers", Edward Arnold, London, 1946.

L. H. Bailey, "Cultivated Conifers in North America", Macmillan, New York, 1948.

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A. Osborn, "Shrubs and Trees for the Garden", Ward Lock and Co., London, 1945.

L. H. Bailey (ed.), "The Standard Cyclopedia of Horticulture", Macmillan, New York, 1947.

J. S. Yeates, "Farm Trees and Hedges", Bulletin No. 12, Massey Agricultural College, 2nd ed., 1948.

M. Sutherland, "Homestead Shelter Planting", Bulletin No. 346, New Zealand Department of Agriculture, Wellington, 1951.

▼ A corner of a small garden which is never dull on the darkest winter's day. Toward the front are the bright yellows and golds of *Chamaecyparis lawsoniana filifera aurea*, *C. obtusa tetragona nana aurea*, *C. obtusa nana aurea*, and *Thuja occidentalis rheingold*. In the background are lighter yellows and blues of Lawson's cypress varieties. Sparrow photo.

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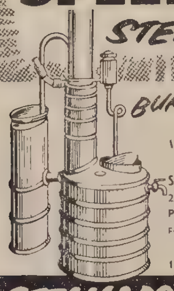

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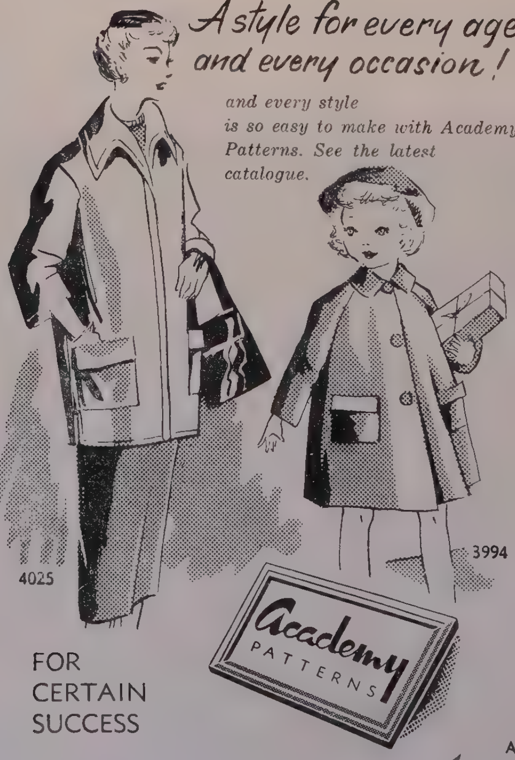

FOR
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A.3

Garden Work in June

In most districts a fairly heavy rainfall can be expected in June which may curtail activities in the flower garden. It is seldom wise to work the soil when it is too wet, especially heavy soil, which will become very lumpy and also too compacted if walked on.

The cleaning up process, as discussed last month, should be finished as soon as possible, if it has not already been done and empty plots dug over for the winter. Shrubberies should also be cultivated as soon as pruning has been finished and any available manure or compost dug in.

In favourable localities, where growth continues in winter, hoeing or light forking up among plants should be done at frequent intervals. The opening up of the topsoil is very beneficial; at times the effect can be almost as good as an application of fertiliser.

Sowing Bedding Plants

Where a glasshouse or a frame is available hardy bedding plants for late spring and early summer display can be sown in northern districts.

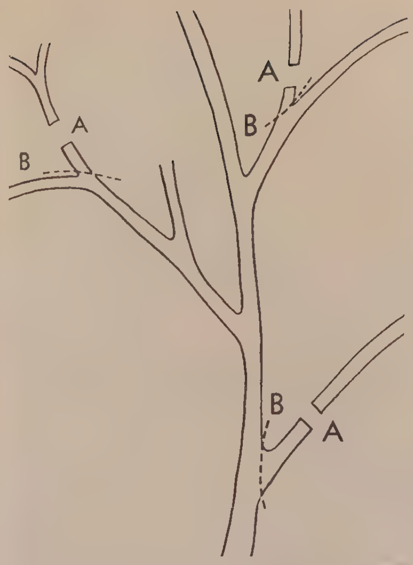
Damping off can cause trouble with young seedlings at this time of year owing to dull days and damp weather. Watering should be done with great care and an added precaution is to treat the seed with a thiram seed dressing before sowing. A small pinch of this material is enough for the average home garden sowing. It is best applied to the seeds in a small glass jar, and to get a full cover the seeds should be shaken up with the dressing for about 5 minutes.

Antirrhinums and stocks are among the subjects that can be raised now. In the north the lobelia variety Crystal Palace should be grown early; for later planting the lighter blue varieties are much more satisfactory. Cinerarias, nemesias, and schizanthus for spring planting can be sown also.

Planting Trees and Shrubs

Planting of trees and shrubs should be continued as soon as the plants come to hand, provided soil conditions are suitable. Planting cannot be done satisfactorily if the soil is wet and sticky and the plants should then be heeled in temporarily. To do this the packing material should be removed (but not the scrim cover around the roots of individual evergreen plants), the roots placed in a shallow trench, and soil firmed lightly round them. Heeled-in plants should be set out in their permanent positions at the earliest suitable time.

Trees and shrubs should also be given attention after they have been planted out. When they are loosened by strong winds, especially after heavy rains, they should be tramped in again as soon as the soil is dry enough. Where a tree has not been staked it will sometimes be found to have swirled round, forming a vase-shaped cavity at the base. This should be filled in and firmed and as the tree has clearly shown that staking is required, this should be attended to without delay.



Do not leave stumps as shown at A. Correct pruning is shown by lines B.

Care should always be exercised when tying to ensure that no damage is done either in the initial tying or from the tie as the plant grows. Several ties should be made if warranted and though tying must be firm, it should be done with soft material, or padding should be added. Old nylon stockings have been found very suitable, as they are strong, durable, and have enough stretch to avoid strangulation of the stem as the wood thickens.

Pruning

It is general practice to prune most trees and shrubs during winter when there generally is less to do in the garden and more time available for the job, but consideration should be given to the most suitable time to prune individual subjects.

Some plants, for example birches and flowering cherries, may lose a considerable amount of sap if pruned severely, especially when this is done late in winter. Severe pruning should be avoided on such plants; instead they should be trained into the desired shape while young and any required cuts should be made now.

Evergreen plants and also roses are generally best pruned late in winter or in early spring. The cuts will then quickly be covered with new growth, but apart from other factors it is during winter that the beauty of evergreen plants is most appreciated.

Early spring flowering subjects such as forsythia, winter flowering jasmine, and ornamental prunus are best pruned immediately after flowering. The flower buds have already developed on these and anything pruned off during winter will reduce the amount of flowers next spring.

Pruning should never be done haphazardly. The object and reason for each particular cut should always be clear. The general aim of pruning ornamental plants should be:—

1. To remove dead and diseased wood.
2. To develop, regulate, and strengthen shape and to facilitate air movement through the plant.
3. To regulate quantity and improve quality of flowers and fruit.

Secateurs should be sharp and well set. Any branch that is too thick for a clean cut with secateurs should be cut with a saw. A pruning saw should have fairly fine teeth but should be set so that it will clear itself when cutting green wood. The rough edges of a saw cut should be trimmed off with a sharp knife to encourage quicker healing. Stumps should never be left, as in most cases they will die and be subject to infection by various diseases. A pruning cut should always be made close to a side branch or bud or flush to the branch it was growing from.

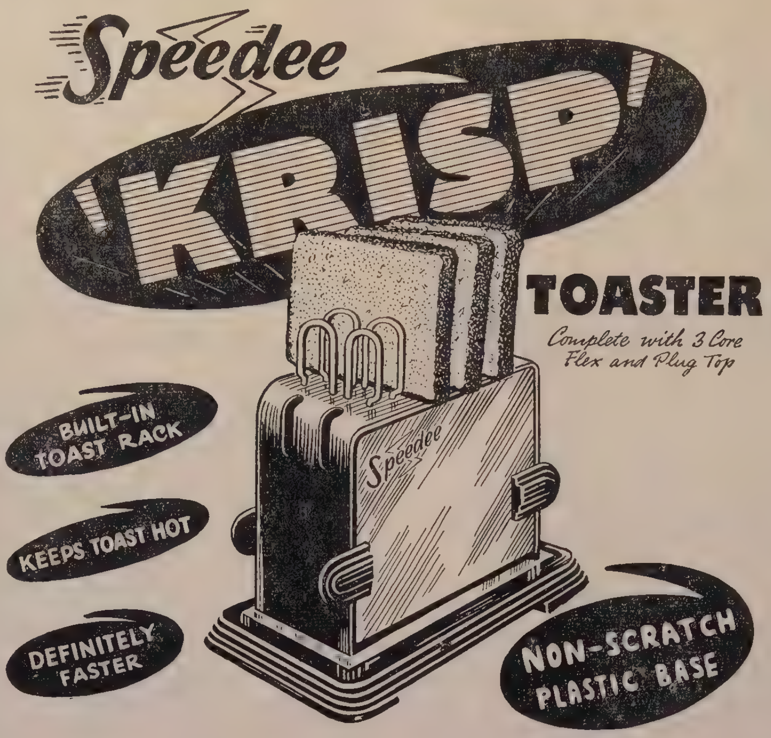
As a final precaution a wood-sealing compound should be applied to all larger cuts.

Care of Tools

Tools can be cleaned and overhauled during wet weather when work cannot be done in the garden. Rusty and blunt tools make work much harder and take the pleasure out of gardening. Many tools are now available in stainless steel and though the cost appears high, they are well worth it because of the ease of working with them. Ordinary tools that have not been cleaned and oiled after use will rust during winter in most districts and it is a good practice to wipe them with an oily rag every time they are put away. It does not take long and saves a lot of annoyance later. One good method for oiling tools is to tie a rag or piece of sacking round a small stick, keep this in a tin with a little oil in the tool shed, and run it over the metal parts after the tools are cleaned.

Rusty tools can be cleaned by rubbing them with a piece of pumice or brick, using plenty of water, but oiling should never be neglected afterward or the job will have been in vain. An occasional sharpening up is well worth while, though tools should not be worn away with a file.

A tidy tool shed, where well cared for tools are hanging in order, always gives satisfaction to the owner, and this is the time of the year for making any required improvements.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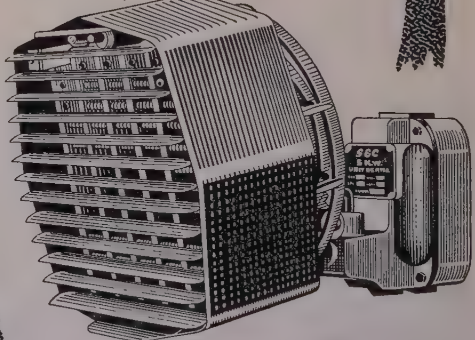
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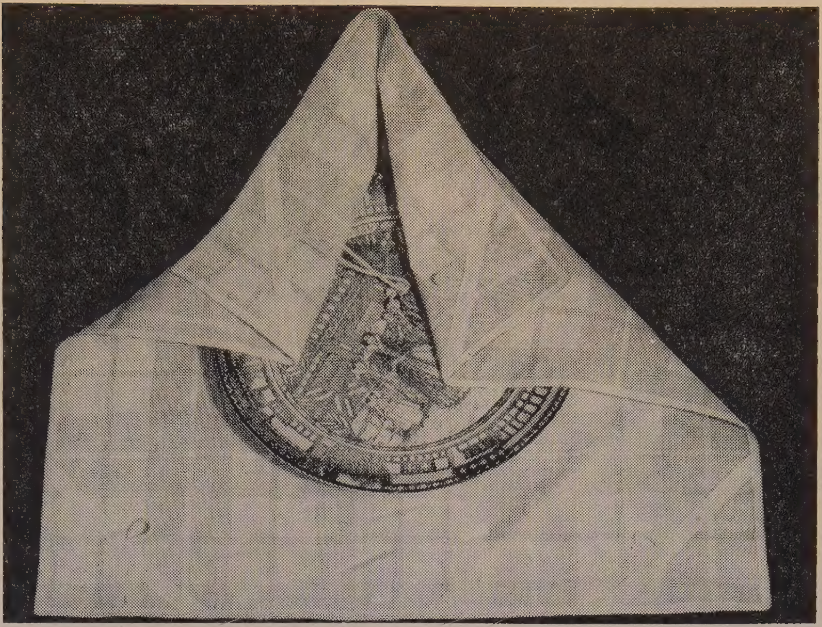
A Plastic Plate Cover

By EVELYN E. MOORE,
Field Officer in Rural Sociology,
Department of Agriculture,
Palmerston North

PERHAPS the majority of New Zealand clubs and organisations in country and town end their notifications of meetings or social evenings with the well-known words "members a plate". To take care of and simplify the transportation of this perhaps typically New Zealand contribution to afternoon tea or supper a plastic plate cover has been devised.



The plate in position on the cover and two ends of the cover folded in. The long loop is slipped through the small loop nearby and then through each of the other two loops in turn.

THE cover has the advantage of being easy to clean and carry, and provided it is sturdily constructed of a good-quality plastic, there is little chance of its collapsing and tipping its contents on the roadway. Covers made of fairly stiff plastic also help to protect the tops of iced cakes and sponges, as they can be made sufficiently stiff to prevent the plastic cover collapsing on top of the cakes.

The cover illustrated is made from ½yd. of 45in.-wide plastic (a medium-weight plastic was chosen), 3½yds. of bias binding, and ½yd. of blazer cord. It is made from a double thickness of plastic for increased strength. This amount makes a cover 18in. square. If desired, however, larger covers may be made up to 20in. to 22in. square, and lace scraps and other types of fancy trimming, provided they are serviceable, may be used instead of bias binding.

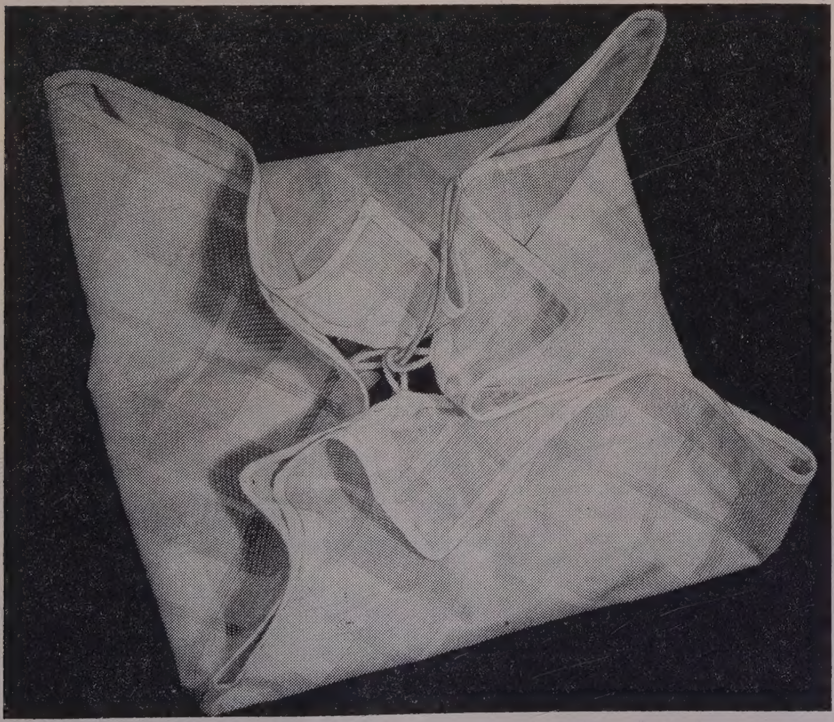
To make the cover fold the plastic in halves and measure off accurately a square with 18in. to 22in. sides, depending on the size of plate to be covered. Measure off 4in. in both directions from each corner and mark lightly with a pencil the triangles thus formed. Cut eight pieces of single-fold bias binding 6in. long and divide the cord into four pieces, three pieces 3in. long and one piece 9in. long. Lay one piece of bias binding exactly on top of another piece and fold one piece of cord into a loop.

Insert the cut ends of the loop between the two pieces of bias binding, midway along it, and tack the loop firmly and neatly in place. Make sure that about ½in. of cord is tucked in between the two strips of binding so that there will be no tendency for it to pull away later. Stitch the binding in place, with the loop pointing inward, on both sides across one of the marked corners. The machine stitching anchors the loop firmly between the two pieces of binding and prevents its tearing at this point. This method is used for the four loops.

Plastic loops should not be used, as they tear too readily. Sew binding and loops on the other three corners, making sure that the loops all point in to the centre of the cover.

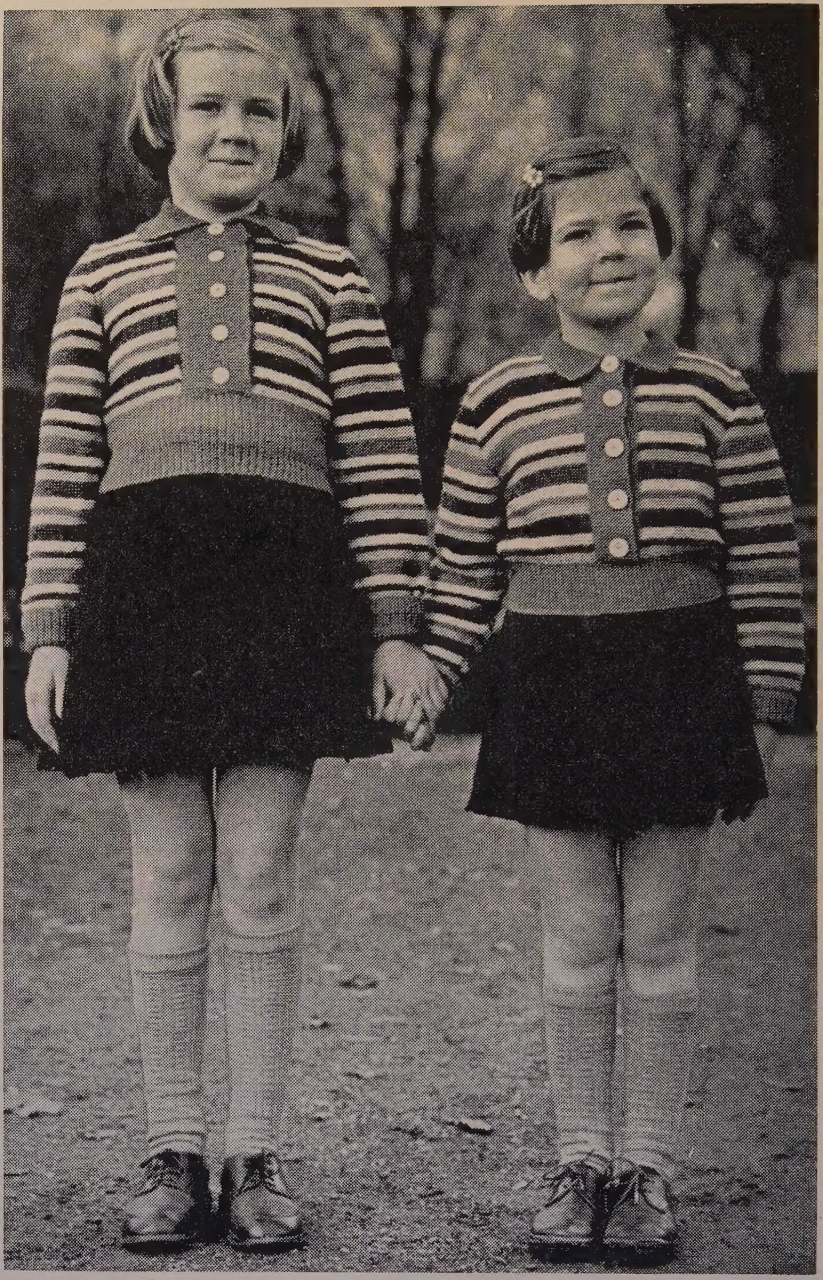
Bind the edges or, if desired, use a lace edging or fancy trimming.

The cover is now ready for use. Place it right side up on the table, put the plate of cakes or sandwiches in the middle, thread the long loop through each of the small loops in turn, and use the long loop to carry the plate.



The cover in place ready for carrying by the long loop.

Colourful Cardigans for Children



THE colourful cardigans in garter stitch illustrated here are suitable for children aged 5 and 7 years respectively. Directions for knitting them are given below.

ABBREVIATIONS: St., stitch(es); k., knit; p., purl; in., inches; beg., beginning; tog., together; rep., repeat.

Materials: 3oz. of red 3-ply wool; 1½oz. of royal blue; 1½oz. of white; 1½oz. of yellow; 1½oz. of bottle green; 1 pair of No. 8 knitting needles; 5 white buttons.

Pattern: Garter stitch (knit all rows).

Back

Using red wool, cast on 70 st. and work in rib of k. 1, p. 1 for 3in. Increase 20 st. at equal intervals in last row of ribbing. Continue in garter stitch as follows: * 6 rows yellow, 4 rows blue, 6 rows white, 10 rows green, 6 rows yellow, 4 rows red, 6 rows white, 10 rows blue, 6 rows yellow, 4 rows green, 6 rows white, 10 rows red. When work measures 5½in. from border, cast off for each armhole: 4 st. at beg. of next 2 rows. Cast off 3 st. at beg. of next 2 rows. Cast off 2 st. at beg. of next 4 rows. Cast off 1 st. at beg. of next 2 rows. Repeat pattern from *. When armhole measures 5½in., after 8th row of wide blue stripe, cast off all st.

Front

Using red wool, cast on 70 st. and work in rib of k. 1, p. 1 for 3in. Increase 20 st. at equal intervals in last row of ribbing. Now place 39 st. on a spare needle for left front and work right front first with the remaining st. Work the first 12 st. in garter st. with red wool throughout. Work the other 39 st. in stripes as given for back. (Note: Twist wool when changing colours at front border.) Make a buttonhole in front border in every 3rd row of every 4 row stripe as follows: K. 5, cast off 2 st., k. 5. In next row, cast on 2 st. to replace those cast off. Make 5 buttonholes in all. Work armhole in same way as given for back. Immediately after completing the 5th buttonhole, cast off for neck, the 12 border st. Then decrease at neck edge 1 st. in every 2nd row until 22 st. remain. After the 8th row of the wide blue stripe, cast off the 22 st. Rejoin wool to the 39 st. from spare needle and work left front. Cast on 12 new st. at front edge for border. Work left front to correspond with right front, omitting the buttonholes.

Sleeves

Work in stripes and colours as for back. Using red wool, cast on 46 st. and work in rib of k. 1, p. 1 for 3in. Increase 10 st. at equal intervals in last row of ribbing. Increase 1 st. at both ends of every 12th row until there are 74 st. on the needle. When work measures about 11in. from border, decrease for top of sleeve: 3 st. at beginning of next 2 rows, then 1 st. at beginning of every row until 19 st. remain; ending with a white stripe. Cast off. Work other sleeve to match.

Collar

Using red wool, cast on 14 st. and work in garter st. until collar measures desired length. Cast off.

To Make up

Sew cardigan together. Sew left front border underneath right front border. Sew collar loosely to neck opening. Crochet one row of single crochet along outside edge of collar. Sew on buttons.

For the next size only the sleeves are made longer, as the pattern of these cardigans stretches. Immediately after the sleeve border, begin with a wide blue stripe, then 6 rows in yellow, etc. Begin top of sleeve with a white stripe so that colours of back, front, and top of sleeves will match.

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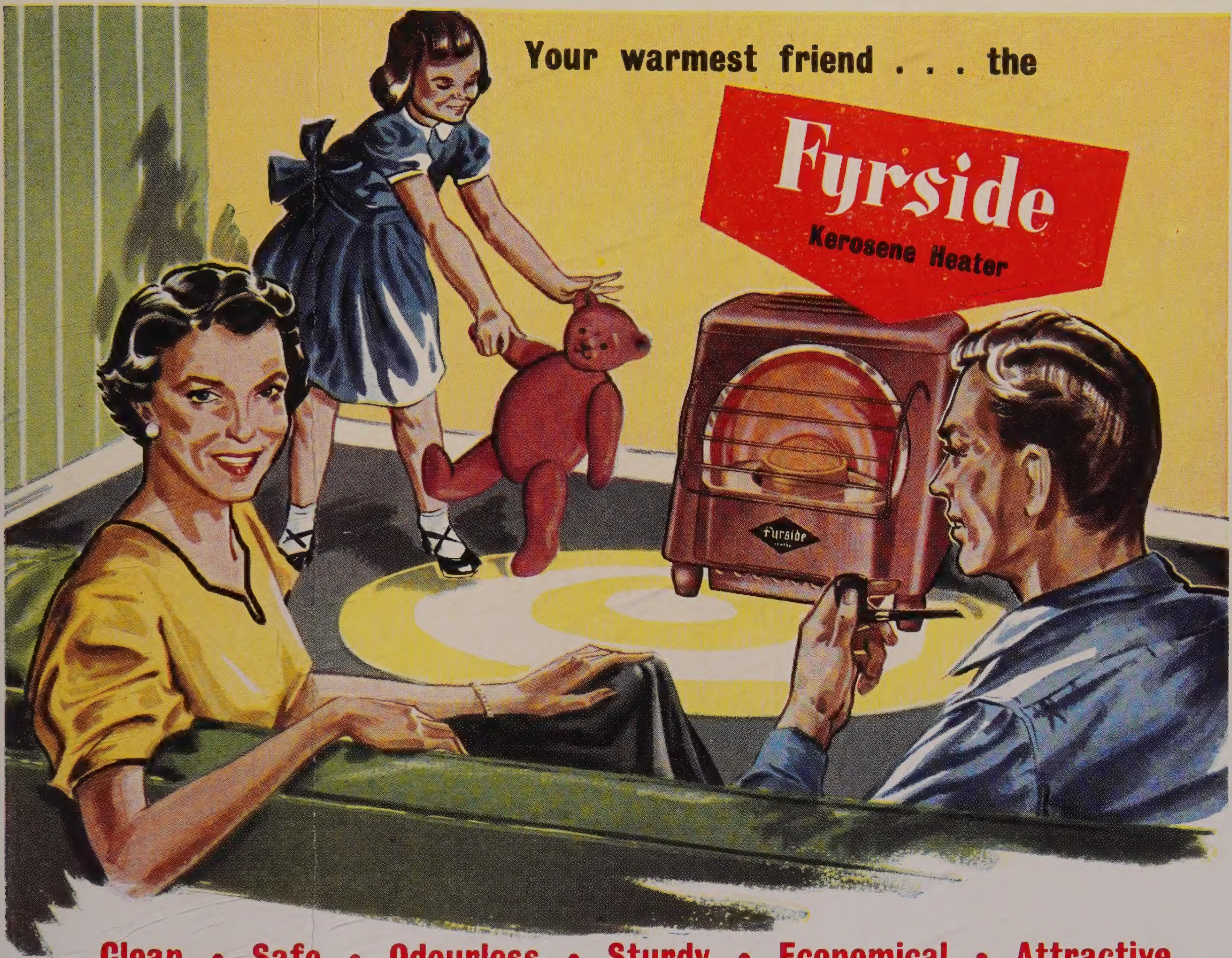

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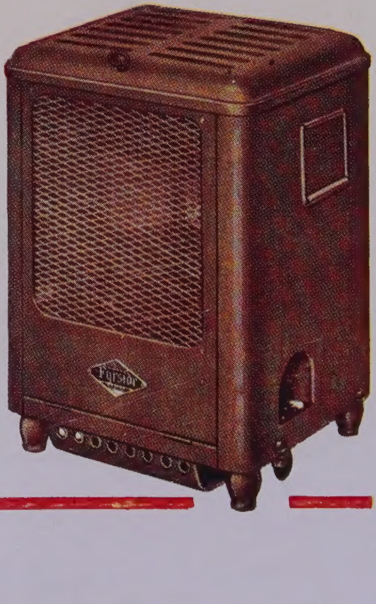

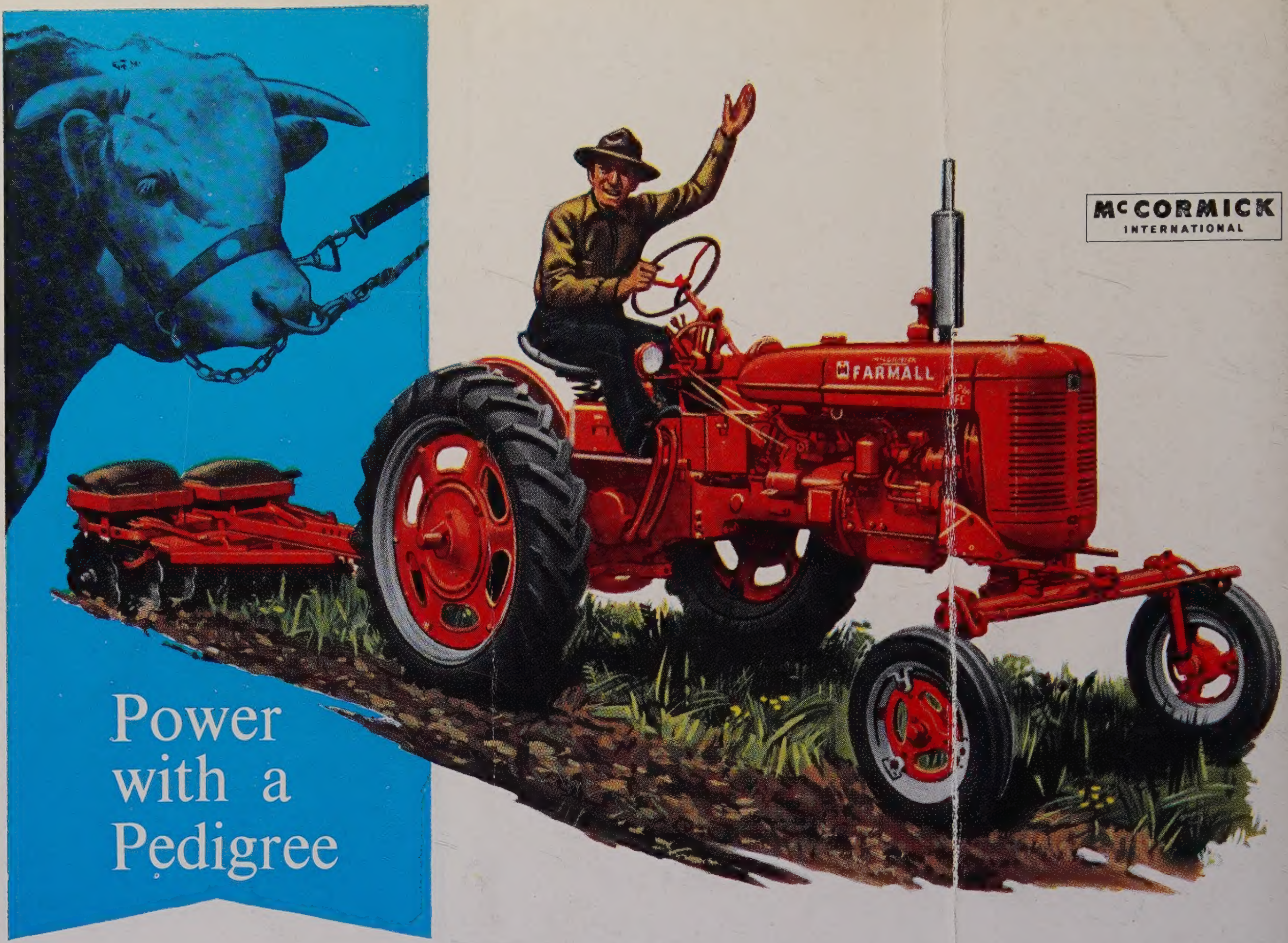

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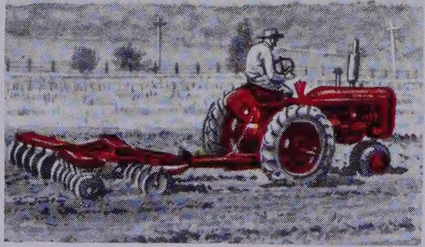

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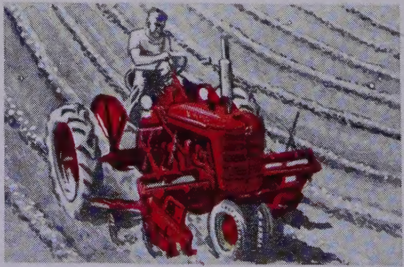

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